PHILOSOPHICAL TRANSACTIONS

OF THE

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FOR THE YEAR MDCCCXXIX.

PART III.

CONTAINING

ASTRONOMICAL OBSERVATIONS

MADE AT THE OBSERVATORY AT PARAMATTA;

By CHARLES RUMKER, Esq.

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MDCCCXXIX.

PREFACE.

THE principal instruments in the Observatory at Paramatta are,

A 5½-feet transit by TROUGHTON.

A 2-feet mural circle by the same.

A 16-inch repeating circle by REICHENBACH.

A 3½-feet telescope with equatorial motion and wire micrometer by BANKS.

Two instruments for observing the variation and dip of the magnetic needle.

The observations made with these instruments were planned with particular respect to the place of the Observatory, and confined to what could be done in the southern hemisphere alone.

The first are magnetic observations. After these follows the geographical position of the Observatory. Observations of latitude in the southern hemisphere could best prove whether the difference usually found between the results derived from stars north of the zenith and those derived from stars south of the zenith, arise from local causes or from imperfections of the instruments. In the reductions of these observations, I have partly made use of the formula given by BOHNENBERGER in his "*Geographische Ortsbestimmung*," § 153. The repeating circle has been in constant use for twenty years, and the nonius of the smaller circle could not be made to close sufficiently to the greater circle. I ascribe it to this cause that the latitudes deduced from some of the observations made with this instrument deviate rather from the truth, the greater part of them having moreover been made without an assistant. The observations made alternately direct and by reflection show on the other hand great consistency; and as the results of these agree with the mean of the observations made with the former instrument on northern and southern stars, there is no doubt of this being the true latitude.

I might have rejected those observations with the repeating circle that de-

viated much from the mean; but I was of opinion that the true latitude was not the sole object of importance, but that it was also desirable to investigate the errors arising from flexibility, or causes not sufficiently known, to which repeating instruments are subject in the southern hemisphere in comparison with those that have been observed in the northern, which could only be effected by a thorough detail of the observations. The longitude of Paramatta is sufficiently known for geographical purposes; and having always objects of more immediate importance in hand, I was unwilling to devote much time to occultations of fixed stars, there being but little chance of corresponding ones being made in other places. But the occultations of the principal stars and planets have been attended to, as well as eclipses and observations of moon-culminating stars.

I have next introduced the solstices observed with the repeating and mural circles at Paramatta. The vicinity of the sun to the zenith at the southern solstice rendered the usual methods of reduction insufficient, and a more correct one became necessary, which has already been partly published in the Memoirs of the Astronomical Society. In the observations of the solstices, I had it also in view to ascertain whether the latitude derived from observations with the repeating circle with the known obliquity from the northern and southern solstice, would exhibit similar anomalies to those observed in Europe. The latitude of Paramatta by the northern solstice is about 4″ less than what the southern gives, and the mean obliquity of the ecliptic as ascertained there by the repeating circle is 1″.7 less than that found by the mural circle, which latter corresponds as nearly as possible with the solar tables.

The use of observations of the inferior conjunction of Venus and the opposition of Mars in that part of the world, as well as the culminations of the moon for determining their respective parallaxes, is obvious.

Observations in the southern hemisphere of those errant bodies that cross our system in all directions from the arctic to the antarctic pole, are during this latter part of their orbit the more interesting, as they complete the series of observations made of them by European astronomers, to whom they are then invisible, or whose notice they may have entirely escaped. It was therefore south of the equator that I chiefly searched for comets. Much time was thus unsuccessfully spent, which I hope will not be perceived in the regular

observations with the transit and mural circle. The observations of the comet of 1825 have already appeared in the Memoirs of the Astronomical Society, where its positions are given according to La Caille's places of the compared stars. In the present work I have reduced them afresh by means of the places of these stars determined from my own observations, being desirous of giving here a complete view of the principal observations made at Paramatta.

The determination of the right ascensions of some of the principal stars of the southern hemisphere by equal as well as by absolute altitudes, has been the most laborious part of my observations. I have omitted the particulars, which would have filled pages void of interest to those who are in possession of more perfect transit instruments, or have the means at hand of correcting their defects. I am, however, not without hopes that the few right ascensions given by me, and which are independent of one another, are free from those small constant errors that cannot easily be discovered in transit instruments.

Next follow the south polar distances of the circumpolar stars deduced from their upper and lower culminations. Of these I have given the original observations, in order to enable others to recompute them, to which they are in my opinion well entitled by their importance. The south polar distance of η Argus, β Crucis, and α Eridani, would probably be more correctly deduced from their upper culminations only, with the polar point derived from the other stars, whilst their lower culminations may serve to establish the law of refraction in the southern hemisphere. It would seem that the effects of the temperature and density of the atmosphere upon the refraction exceed the tabular corrections, which may be owing to a greater elasticity of the air in this warm climate. The conclusion makes a catalogue of the south polar distances of these stars with their constants of aberration and nutation.

A future volume will contain a catalogue of the stars of the southern hemisphere, deduced from the observations with the transit and mural circle.

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PHILOSOPHICAL TRANSACTIONS.

Astronomical Observations made at the Observatory at Paramatta in New South Wales. By CHARLES RUMKER, *Esq. Astronomer.*

I. *Magnetic Observations made at Paramatta.*

Variation of the Needle observed with DOLLOND's Magnetic Transit.

Day of the Month.	Magnetic Meridian.	True Meridian.	Variation of the Needle.
1822. Oct. 23	282° 24′ 30″	273° 40′ 40″	8° 43′ 50″
1823. Feb. 10	„ 29 7	„ 42 20	„ 46 47
12	„ 29 20	„ 46 20	„ 43 0
13	„ 30 15	„ 54 20	„ 36 0
14	„ 24 20	„ 50 20	„ 34 0
15	„ 28 10	„ 50 20	„ 37 50
17	„ 26 40	„ 51 41	„ 35 0
March 2	„ 18 23	„ 46 17	„ 32 6
10	„ 36 40	„ 45 10	„ 51 30
14	„ 24 20	„ 47 8	„ 37 12
19	„ 24 33	„ 45 55	„ 38 38
20	„ 25 7	„ 45 0	„ 40 7
21	„ 37 0	„ 43 20	„ 53 40
22	„ 20 10	„ 40 20	„ 39 50
26	„ 32 17	„ 45 45	„ 46 32
27	„ 30 40	„ 40 7	„ 50 33
31	„ 21 50	„ 38 23	„ 43 27
April 19	„ 20 30	„ 33 27	„ 47 3
May 3	„ 16 55	„ 35 0	„ 41 55
9	„ 20 7	„ 34 0	„ 46 7
June 14	„ 25 43	„ 34 7	„ 51 36
Mean for March 1823			8 42 43

Observations made after reversing the instrument 180° in Azimuth.

Day of the Month.	Magnetic Meridian.	True Meridian.	Variation of the Needle.
1823. May 7	102° 18′ 13″	93° 28′ 37″	8° 49′ 36″
10	„ 27 0	„ 28 50	„ 57 40
31	„ 18 30	„ 28 50	„ 50 40
Mean for May after Reversion ..			8 52 39
Mean for March before Reversion.			8 42 43
Variation, April 1823			8 47 41

For the information of persons who are not acquainted with the nature of the instrument, it is necessary to add that the transit of the sun was observed with the same tube with which, after an application of a microscope, the position of the needle, or magnetic meridian, could be read off the limb surrounding it, whilst three nonii gave the division corresponding to the true meridian on that day.

Not considering the magnetic observations of sufficient importance to neglect on their account the observations of the sun with the regular transit and mural circle, I left an assistant to observe its culmination with the magnetic transit; and as this instrument could not be kept permanently in the same position, I directed him to turn the tangent screw of the azimuth circle so as to bring the first wire in contact with the sun's preceding limb at a second of a chronometer, computed for that purpose, with the declination for the interval of wires and semidiameter. For any difference found after the reduction of the wires, a correction of the azimuth remained to be made. With more attention greater accuracy might have been obtained, although the application of the microscope to the tube could not fail of displacing the optical axis.

Dip of the Needle observed with a Dipping Compass made by GAMBEY of Paris.

By direct Observation.	
Date.	Dip.
	° ′ ″
November 1821	62 56 19
March 21, 1823	62 18 40

In five minutes the Needle made in November 1821,

In the magnetic meridian .. 128.0 vibrations.

In the magnetic prime vertical 120.8 ———

Therefore $\left(\frac{T}{T'}\right)^2 = \cos \text{dip} = 62° 57'$.

II. *Latitude of the Observatory.*

Observations for determining the latitude have not merely a local interest. The differences between the latitudes derived from stars north and south of the zenith, as well as from upper and lower solstices, have long been an object of speculation by astronomers; so that a series of observations for the latitude of any place on the surface of the earth is valuable: and if the anomalies alluded to should not originate in the defects of the instruments alone, but in hitherto unknown laws of Nature, observations in the Southern hemisphere will be doubly interesting.

1. *Latitude by Repetitions on Circumpolar Stars in their upper and lower Culminations.*

Superior Culmination of β Argus.

Day of the Month.	Observed Zen. Distances or Simple Arc.	Baron.	Therm. Fahr.	Refraction.	Red^{n} to the Meridian.	True Meridian Zenith Distance.
1822.	° ′ ″	inches.	°	″	′ ″	° ′ ″
Sept. 1	35 15 28.3	29.89	60	40.2	−5 56.9	35 10 11.6
3	„ 14 33.4	29.80	64	39.6	5 2.85	„ „ 10.2
5	„ 13 35.0	29.56	67	39.4	4 5.3	„ „ 9.1
5	„ 16 13.55	.....	....	39.1	6 50.5	„ „ 2.1
12	„ 15 20.2	30.03	58	41.6	5 58.5	„ „ 3.3
14	„ 14 49.0	29.38	63	39.2	5 22.9	„ „ 5.3
14	„ 14 47.5	.....	....	.....	5 24.0	„ „ 2.7
16	„ 14 13.9	29.87	54	40.0	4 46.0	„ „ 8.0
16	„ 16 13.6	.....	54.3	40.1	6 43.5	„ „ 10.2
17	„ 18 17.6	29.92	57.0	40.5	8 57.15	„ „ 1.03
18	„ 13 42.9	29.84	59.7	40.0	4 16.7	„ „ 6.2
18	„ 17 40.7	.....	....	40.0	8 20.4	„ „ 0.7
19	„ 13 18.6	29.56	70.5	38.7	3 56.6	„ „ 0.77
22	„ 10 30.0	29.57	65	39.2	1 2.46	„ „ 6.76
22	„ 18 19.7	.....	....	39.4	8 56.5	„ „ 2.58
23	„ 13 26.3	29.60	62	39.6	3 55.1	„ „ 10.8
24	„ 18 23.0	29.82	70	39.3	9 9.9	„ 9 52.4
25	„ 14 55.5	29.91	65.5	39.8	5 24.2	„ 10 11.0
26	„ 15 21.0	29.77	61.5	40.0	−5 58.0	„ „ 3.0
Mean corresponding to September 16 (True Declin. 68° 59′ 2″.22)						35 10 4.88

Inferior Culmination of β Argus.

	° ′ ″	inches.	°	′ ″	′ ″	° ′ ″
Sept. 16	77 5 59.9	29.89	43	4 12.0	+1 44.1	77 11 55.8
21	„ 3 27.8	29.39	57	3 59.7	4 32.9	„ 12 0.4
23	„ 7 29.6	29.72	59.8	4 2.6	28.8	„ 12 1.0
23	„ 0 58.8	.....	....	4 0.2	7 0.1	„ 11 59.1
24	„ 3 32.5	29.92	50	4 7.9	+4 14.5	„ 11 54.9
Mean of the inferior passages corresponding to September 21						77 11 58.2
Mean of the superior passages reduced for Aberration, Nutation, and Precession, September 21						35 10 04.33
Latitude by upper and lower culmination of β Argus						33 48 58.73

The inferior culminations were here unavoidably interrupted on account of the comet in Ophiucho. The repetitions on β Argus in the star's superior passage were observed in the day-time.

2. *Latitude by repetitions on Stars North and South of the Zenith.*

a. Repetitions on Stars South of the Zenith.

Canopus.

1822.	Barom.	Therm.	Simple Arc Cor. for Level.	Refraction.	Reduction to Meridian.	True Merid. Zenith Dist.	True Declination.	Latitude.
	inches.	°	° ′ ″	″	′ ″	° ′ ″	° ′ ″	° ′ ″
Jan. 16	....	....	19 2 38.3	+19.3	−15 47.26	18 47 10.84	52 36 6.86	33 48 56.02
18	....	....	„ 3 41.4	19.3	16 58.54	„ „ 2.17	„ „ 7.2	„ 49 5.03
18	....	....	18 49 17.4	19.0	2 28.22	„ „ 8.18	.....	„ 48 59.02
23	30.00	75	„ 58 52.13	18.9	11 58.54	„ „ 12.5	„ „ 8.8	„ „ 56.3
26	30.02	74	19 13 47.6	19.3	27 15.3	„ 46 51.6	„ „ 10.0	„ 49 18.4
27	29.93	75	18 51 10.5	18.9	4 9.04	„ 47 20.36	„ „ 10.29	„ 48 49.93
							Mean	33 49 0.8

α Trianguli Australis.

Aug. 14	30.112	46	34 53 18.74	+41.11	− 1 27.91	34 52 31.94	68 41 33.44	33 49 1.5
			34 55 49.25	41.16	4 5.44	„ 52 24.97	.....	„ „ 8.5
							Mean	33 49 5.0

β Argus.

Oct. 21	29.72	60.3	35 16 7.44	+39.96	− 6 42.6	35 10 4.8	68 58 58.33	33 48 53.53
21	....	....	„ 16 20.41	.....	7 3.1	„ 9 57.27	.....	„ 49 1.06
22	30.01	60.0	„ 15 16.66	40.34	5 53.1	„ 10 3.9	.....	„ 48 54.43
22	....	....	„ 15 14.03	.....	5 54.2	„ 10 0.09	.....	„ 48 58.24
23	30.16	59.0	„ 17 12.87	40.67	7 48.4	„ 10 5.14	.....	„ „ 53.19
23	....	....	„ 16 11.10	40.67	6 55.2	„ 9 56.57	.....	„ 49 1.76

Mean of the latitude by β Argus (weight 3)	33 48 57.03
Canopus (weight 3)	„ 49 0.8
α Trianguli (weight 1).....	„ 49 5.0
Mean of the latitude deduced from observation of stars south of zenith..	33 48 59.8

b. Repetitions on Stars North of the Zenith.

α Ceti.

1821.	Barom.	Therm.	Simple Arc Cor. for Level.	Refraction.	Reduction to Meridian.	True Merid. Zenith Dist.	True Declination.	Latitude.
Dec. 22	....	....	° ′ ″ 37 33 57.6	+″ 42.9	−″ 22.15	° ′ ″ 37 12 8.35	° ′ ″ 3 23 13.9	° ′ ″ 33 48 54.4
	....	....	„ 12 22.4	42.3	0 53.09	„ 12 11.61	.....	„ „ 57.7
	....	....	„ 18 30.7	42.3	7 15.66	„ 11 57.74	.....	„ „ 43.8
	....	....	„ 38 43.6	43.0	27 33.55	„ 11 53.95	.....	„ „ 39.1

1822.	Barom.	Therm.	Simple Arc Cor. for Level.	Refraction.	Reduction to Meridian.	True Merid. Zenith Dist.	True Declination.	Latitude.
			Aldebaran.					
Jan. 17	inches. 30.10	° 70	° ′ ″ 50 30 18.1	+ ′ ″ 1 7.9	− ″ 34 0.6	° ′ ″ 49 57 25.4	° ′ ″ 16 8 46.1	° ′ ″ 33 48 39.3
			Rigel.					
1822. Jan. 20	29.90	75	25 25 23.9	+26.16	− 1 53.28	25 23 56.78	8 24 46.6	33 48 43.4
			α Orionis.					
1822. Feb. 1	30.17	70	41 39 16.9 „ 11 37.1	+49.9 49.1	−29 18 1 40.1	41 10 48.8 „ 10 46.1	7 22 1.2	33 48 47.6 „ 48 44.9
			Procyon.					
1822. Feb. 3	30.135	73	40 15 16.9 39 30 43.9	+47.1 45.83	−46 56.65 2 13.33	39 29 6.25 „ 29 16.4	5 40 28.7	33 48 37.5 „ 48 47.7

The following observations of the sun were made during the Northern Solstice 1822, by Sir THOMAS BRISBANE, with a reflecting circle of TROUGHTON, excepting the last, which was made by him with a reflecting circle of JECKER of Paris.

1822.	True Zenith Distance of Sun's Centre.	Correction for Sun's Latitude.	Reduction to Solstice.	Apparent Zenith Distance of Tropic.
	° ′ ″	″	′ ″	° ′ ″
June 20	57 15 47.10	−0.22	+0 48.43	57 16 35.3
21	„ 16 21.22	0.12	0 11.77	„ „ 32.9
23	„ 16 24.8	+0.17	0 13.07	„ „ 38.0
23	„ 16 31.35	0.17	0 13.07	„ „ 44.6
	Mean			57 16 37.7
	Apparent obliquity			23 27 53.0
	Latitude (with the weight 4) ..			33 48 44.7

Combining this latitude by the sun with the preceding observations of stars north of the zenith, we have on a mean the latitude 33° 48′ 45″.3.

With these latitudes should be classed the

c. Latitude by Solstices*.

Southern Solstices.

	December 1821.	December 1822.	December 1823.	December 1826.	December 1827.
Tropic Zenith Distance	10° 21′ 2.23″	10° 20′ 58.2″	10° 21′ 4.02″	10° 20′ 57.9″	10° 21′ 4.2″
Mean obliquity	23 27 45.70	23 27 45.3	23 27 44.90	23 27 43.7	23 27 43.3
Latitude.....	33 48 47.9	33 48 43.5	33 48 48.92	33 48 41.6	33 48 47.5

Northern Solstices.

	June 1822.	June 1823.	June 1826.	June 1827.	June 1828.
Zenith Dist. of Tropic.	57 16 25.9	57 16 27.0	57 16 30.9	57 16 23.0	57 16 22.8
Mean obliquity	23 27 45.5	23 27 45.1	23 27 43.9	23 27 43.5	23 27 43.1
Latitude.....	33 48 40.4	33 48 41.9	33 48 47.0	33 48 39.5	33 48 39.7

Latitude by a mean of the Southern Solstices	33 48 45.9
by a mean of the Northern Solstices	33 48 41.7
by Northern Stars as before.....	33 48 45.3
by repetitions North of Zenith.....	33 48 44.3
ditto South as above	„ „ 59.3
by a mean.....	33 48 51.8
Difference between observation N. and S.....	„ „ 15.0

This shows that the zenith distances have been observed too small; and the solstice moreover seems to indicate that the error increases with the zenith distance. Without investigating the cause of this error, we may suppose equal zenith distances on either side of the zenith equally influenced by it. Calling therefore δ and z the declination and observed zenith distance of the northern, and δ' and z' those of the southern star in his superior culmination, and x the correction of the zenith distance, we have, if both stars have south declination (in general if latitude and declination are of the same name)

$$z + x + \delta = \text{latitude}$$
$$\text{and } \delta' - z' - x = \text{latitude}$$
$$\text{whence } \frac{z - z'}{2} + \frac{\delta + \delta'}{2} = \text{latitude}.$$

And thus the error x of the instrument is eliminated.

* The solstices of 1821 and 1822 were observed by Sir Thomas Brisbane and myself conjointly; those in 1823, by Sir Thomas Brisbane; and the remainder by myself alone.

If one of the stars has north declination, the formula is $\frac{z-z'}{2}+\frac{\delta'-\delta}{2}=$ latitude.

Thus in the mean of the zenith distances of

α Ceti, Procyon, α Orionis, and Rigel	$z=$	35°	48′	59.″56	Declinat. $\delta=$	2°	0′	14.″3 N.
and the zenith distance of β Argus, 6th Oct.	$z'=$	35	10	3.08	——— $\delta'=$	68	59	0.3 S.
	$\frac{1}{2}(z-z')=$	0	19	28.24	$\frac{1}{2}(\delta'-\delta)=$	33	29	22.98
					$\frac{1}{2}(z-z')=$	0	19	28.24
					Latitude =	33	48	51.22

The mean of the zenith distances of the

Tropic of Capricorn is.....	$z=$	10°	21′	1.″31	Obliquity $\delta=$	23	27	44.58 N.
Zenith distance of Canopus,.....	$z'=$	18	47	7.61	Declinat. $\delta'=$	52	36	8.39 S.
	$\frac{1}{2}(z'-z)=$	4	13.	3.15	$\frac{1}{2}(\delta'+\delta)=$	38	1	56.48
					$\frac{1}{2}(z'-z)=$	4	13	3.15
					Latitude =	33	48	53.33

The zenith distance of the

Tropic of Cancer is.....	$z=$	57°	16′	25.″3	Obliquity $\delta=$	23	27	44.22 N.
α Trianguli	$z'=$	34	52	28.4	Declinat. $\delta'=$	68	41	33.44 S.
	$\frac{1}{2}(z-z')=$	11	11	58.4	$\frac{1}{2}(\delta'-\delta)=$	22	36	54.61
					Hence, Latitude	33	48	53.03

If one of the stars is below the pole, and the other below the equator, the formula becomes .... Colatitude $=\frac{1}{2}(z'-z)+\frac{1}{2}(\delta'+\delta)$.

Thus the zenith distance of

Tropic of Cancer	$z=$	57°	16′	25.″3	Obliquity $\delta=$	23°	27′	44.″22
β Argus, S. P.....	$z'=$	77	11	58.2	Declinat. $\delta'=$	68	59	2.22
	$\frac{1}{2}(z'-z)=$	9	57	46.45	$\frac{1}{2}(\delta'+\delta)=$	46	13	23.22
					Hence, Latitude	33	48	50.33
The mean of the latitudes thus found is						33	48	52.0

3. *Latitude by* Reichenbach's *Circle without Repetitions.*

In the following observations, the level has been kept invariably in the same position to the great circle, which has never been revolved about its axis. But the circle has been alternately revolved 180° in azimuth, in order to observe one and the same star on the meridian right and left of the division answering to the zenith. The great circle being at the same time kept by means of the

level constantly in the same position to the horizon, so that half the sum of the readings R and L is the zenith point, and half their difference the star's zenith distance.

Canopus.

1828.	Barom.	Therm.	Readings. R.	Readings. L.
	inches.	°	° ′ ″	° ′ ″
July 4	30.152	58	18 47 5.75	
6	30.02	55	.....	341 12 20
9	29.74	56	„ 47 0.5	
11	30.05	49.3	.....	„ 12 15
12	29.96	52	„ 46 55	
13	29.91	47.2	„ 47 1.0	
14	30.05	56.0	.....	„ 12 18.5
16	29.703	65.6	„ 47 3.7	
17	29.85	64.5	.....	„ 12 10.7
18	30.025	55	„ 47 0.2	
20	29.622	55.8	„ 46 56.4	
21	29.60	56.2	.....	„ 12 12.0
22	29.94	54.5	„ 46 23.2	
23	30.15	50.7	„ 46 36.0	
24	30.07	48.5	.....	„ 12 15
25	30.21	52	„ 46 29.5	
28	30.24	47	.....	„ 12 16.0
30	30.26	45.5	.....	„ 12 38.0
Aug. 1	30.25	53	.....	„ 12 33.0
2	30.25	49.4	„ 46 48.9	
3	30.233	47.5	.....	„ 12 41.5
11	30.18	49.3	.....	„ 12 30.5
13	30.062	50	„ 46 33.5	
14	29.87	50.8	„ 46 34.0	
15	29.62	57.0	.....	„ 12 31.0
16	29.65	57.3	„ 46 39.0	
19	30.102	47.2	„ 46 43.0	
20	30.09	48	.....	„ 12 32.5
July 27	29.956	53.4	18 46 47.81	
	30.04	52.1	.....	341 12 24.12
Refraction.....			„ + 19.4	„ − 19.4
			18 47 7.2	341 12 4.72
½ Differ. = true Mer. Zen. Dist. =				18 47 31.25
True Declination				52 36 15.35
Latitude.....				33 48 44.1
Zenith = − 24″.3				

Sirius.

1828.	Barom.	Therm.	Readings. R.	Readings. L.
	inches.	°	° ′ ″	° ′ ″
July 11	30.05	49.3	.....	17 18 24.5
12	29.96	52	342 40 35	
13	29.91	47.2	„ 40 34.5	
14	30.05	56.0	.....	„ „ 38.0
15	29.99	57.0	„ „ 34.5	
16	29.703	65.6	„ „ 39.0	
17	29.85	64.5	.....	„ „ 46
18	30.02	55	„ „ 30	
20	29.62	55.3	„ „ 25.2	
21	29.60	56.5	.....	„ „ 37.5
22	29.94	54.5	„ „ 32.2	
23	30.15	50.7	„ „ 8.3	
25	30.21	53.7	„ „ 45.0	
26	30.38	55	.....	„ „ 51.5
27	30.24	47.0	.....	„ „ 40.0
30	30.26	46	.....	„ „ 50
31	30.24	49.3	„ „ 26	
Aug. 1	30.25	51.3	.....	„ „ 42
2	30.23	49	.....	„ „ 53.8
3	30.25	49.4	„ „ 29.2	
13	30.06	50	„ „ 15.5	
14	29.87	51	„ „ 27.5	
15	29.62	57	.....	„ „ 52
16	29.65	57.3	„ „ 18.7	
19	30.10	47.2	„ 39 57.7	
20	30.09	48.0	.....	„ „ 52.0
July 28	29.972	53.1	342 40 26.55	
	30.074	52.7	.....	17 18 44.33
Refraction.....			„ − 17.91	„ + 17.97
			342 40 8.64	17 19 2.3
True Meridian Zenith Distance..				17 19 26.83
Declinat. from Nautical Almanac				16 29 17.7
				Latitude = 33 48 44.5
				Zenith = − 24.53

α Eridani.

1828.	Barom.	Therm.	Readings. R.	Readings. L.
	inches.	°	° ′ ″	° ′ ″
July 6	30.05	36.5	.....	335 42 20.0
12	29.93	37.5	.....	„ „ 20.0
13	29.91	33.0	24 16 36.5	
14	29.99	40.0	.....	„ „ 31.0
18	29.56	41.0	„ „ 36.0	
20	29.99	39.0	.....	„ „ 27.2
12	29.905	37.8	24 16 36.2	335 42 24.6
Supplement of L..			24 17 35.4	
Half Sum			24 17 5.8	
Refraction			„ „ 26.85	Zenith — 29.6
			24 17 32.65	
True Declination..			58 6 19.5	
Latitude			33 48 47.0	

Aldebaran.

1828.	Barom.	Therm.	Readings. R.	Readings. L.
	inches.	°	° ′ ″	° ′ ″
July 18	30.02	45.2	.....	310 2 12.0
20	29.62	55.3	.....	„ „ 27.0
22	29.94	48.0	49 56 34.3	
23	30.15	41.2	.....	„ „ 15.0
24	30.07	41.3	„ „ 49.0	
25	30.18	40.0	.....	„ „ 29.0
Aug. 1	30.23	34.5	„ „ 34.0	
July 23	30.08	41.3	49 56 39.1	
	29.99	45.4	.....	310 2 21.0
Refraction..			+ 1 9.87	— 1 9.8
Zenith — 30.0			49 57 49.0	310 1 11.2

Hence true Meridian Zenith Dist. 49 58 18.9
Declin. 16° 9′ 17″.8. Lat. 33° 49′ 1″.1

Canopus.

1828.	Barom.	Therm.	Readings. R.	Readings. L.
	inches.	°	° ′ ″	° ′ ″
Sept. 8	29.90	56	18 46 25.4	.....
9	29.86	55.4	.....	341 12 37.7
10	30.00	44.5	„ „ 26.8	
11	30.28	46	.....	„ „ 22.0
15	29.84	63.3	„ „ 32.6	
23	30.30	50	„ „ 30.0	
24	30.35	60	.....	„ „ 18.8
25	30.35	52	.....	„ „ 36.0
26	30.17	48	„ „ 26.5	
31	29.88	56	.....	„ „ 38.5
Sept 18	30.093	53.1	18 46 28.3	341 12 28.7
Supplement of L..			18 47 28.7	
Half Sum			18 46 58.5	
Refraction			+ 19.6	
True Mer. Zen. Dist.			18 47 18.1	
True S. Pol. Dist...			37 23 52.6	
Latitude			33 48 49.3	
Zenith			„ „ 30.2	

β Argus.

1828.	Barom.	Therm.	Readings. R.	Readings. L.
	inches.	°	° ′ ″	° ′ ″
Sept. 9	29.864	55.4	.....	324 48 12.7
10	30.04	54.5	35 10 34.8	
11	30.30	55.3	.....	„ „ 5.0
15	29.84	63.3	„ „ 38.0	
17	30.10	57	.....	„ „ 23.5
25	30.37	66.5	.....	„ „ 20.6
27	30.05	65.5	„ „ 45	
28	29.92	71.7	„ „ 50.0	
Oct. 1	29.50	66	.....	„ „ 11.0
2	30.18	57	.....	„ „ 26.5
6	30.16	56	.....	„ „ 17.2
Sept 21	30.09	60.7	35 10 41.95	324 48 16.64
Supplement of L..			35 11 43.36	
			35 11 12.65	
Refraction			„ „ 40.29	
True Mer. Zen. Dist.			35 11 52.94	
True Declination..			69 0 38.55	
Latitude			33 48 45.61	
Zenith			„ „ 30.7	

Latitude by a mean of these Observations = 33° 48′ 48″.55

Remarks.—These results are somewhat contradictory to the last, the southern stars giving rather less for latitude than the northern, which would prove that the zenith distances had been observed too great.

When a method leaves us in uncertainty, we must resort to another that is independent of those errors that vitiated the former. One of the effects of gravity is, that it causes eccentricity in the repeating circle when used in the manner last described, by depressing the small circle, which carries the tube, below the centre of the great circle's division; so that the optical axes, or radii of the double zenith distances, are removed downwards parallel to themselves, and thus subtending a greater arc of the limb, make the observed zenith distance too great. The observations alternately direct and by reflection, are free of these errors, for the displaced vertex of the observed arc remains in the diameter that is parallax to its chord.

In the preceding observations, the refraction corresponding to the mean height of the barometer and thermometer has been applied to the mean of the zenith distances. There is no error in this, the change of the refraction being in all tables assumed proportional to that of the barometer and thermometer in so small limits. But I have also employed the true south polar distance corresponding to the mean date, instead of correcting it for each particular day. The error thence resulting is within the probable limits of the steadiness of the level, from its being differently influenced by temperature on different days.

IV. *Latitude by Observations alternately direct, and by Reflection from Mercury.*

1. Observations of the Sun with the Mural Circle near the Southern Solstice, December 1827.

Limb.	1827.	Barom.	Therm.	Observation.	Microscopes. I.	II.	III.	IV.	Refr.	Parall.
		inches.	°		° ′ ″	′ ″	′ ″	′ ″	″	″
L	Dec. 25	29.71	102	direct	67 4 31.6	4 48.6	4 46.5	4 45.8	9.53	1.6
L	28	30.03	83.3	direct	67 10 22.2	10 25.6	10 18.3	10 28.0	10.19	1.6
L	Jan. 1	30.05	85	by reflection.	225 26 50.0	26 58.0	27 7.5	26 50.3	10.4	1.65
U	2	30.044	89	by reflection.	225 54 47.0	54 58.0	55 1.0	54 53.3	9.83	1.6
L	4	30.114	86	by reflection.	225 11 13.7	11 24.7	11 30.3	11 20.5	10.70	1.7
L	10	29.758	80.	direct	68 22 38.9	22 54.5	22 49.8	22 52.3	11.40	1.8

Reduction.

Direct.							By Reflection.						
Date.	Mean of Four Microscopes.	Refr. Paral.	Semidiameter.	Reduction to Solstice.	Corr. for Sun's latitude.	South Pol. Distance per Microscope.	Date.	Mean of Four Microscopes.	Refr. Paral.	Semidiameter.	Reduction to Solstice.	Corr. for Sun's Lat.	South Pol. Distance per Microscope.
Dec. 25	67 ° 4′ 43.1	7.93	16′ 17.67	0 ° 1′ 29.78	−0.36	66 ° 47′ 5.22	Jan. 1	226 ° 26′ 56.4	8.75	16′ 17.8	21′ 25.26	−0.61	226 ° 4′ 28.1
28	„ 10 23.5	8.6	„ 17.85	0 71 0.84	+0.05	„ 47 3.46	2	„ 54 54.8	8.2	16 17.8	26 0.3	−0.70	„ „ 28.4
10	„ 22 48.9	9.6	„ 17.5	1 19 50.85	+0.30	„ 46 50.45	4	„ 11 22.3	9.0	16 17.75	36 45.9	−0.78	„ „ 16.17
				Mean.....		66 46 59.04						Mean.....	226 4 24.22

Half Difference = true Altitude = 79 ° 38′ 42.59 of Tropic.
Apparent Obliquity 23 27 34.7

Latitude 33 48 52.1

2. Southern Solstice, December 1828, observed alternately direct and by Reflection, with the Mural Circle.

1828.	Direct. South Polar Distance of Tropic from the Zero of the Circle per Microscope.				Refract. Parallel applied.	By Reflection. South Polar Distance of Tropic from the Zero of the Circle per Microscope.			
	I.	II.	III.	IV.		I.	II.	III.	IV.
Dec. 13	66 ° 46′ 44.7	46′ 59.7	46′ 53.7	46′ 56.5	8.8				
14	„ „ 31.2	„ 53.0	„ 41.5	„ 45.2					
15	„ „ 40.03	„ 49.33	„ 41.03	„ 52.03	8.2				
16	.....	.....	.....	.....	7.6	226 ° 4′ 9.4	4′ 16.6	4′ 24.1	4′ 15.1
17	„ „ 42.2	„ 47.4	„ 37.2	„ 40.4	7.5				
18	.....	.....	.....	.....	8.1	„ „ 4.72	4 14.3	„ 16.9	„ 7.8
19	.....	.....	.....	.....	8.1	„ „ 8.3	„ 11.8	„ 19.0	„ 13.6
20	„ „ 38.7	„ 48.6	„ 43.2	„ 45.6	7.4				
21	.....	.....	.....	.....	7.8	„ „ 8.6	„ 9.3	„ 14.8	„ 12.0
Mean ..	66 46 39.31	46 51.6	46 43.3	46 47.94		226 4 8.4	4 13.0	4 18.7	4 12.1
	226 4 8.4	4 13.0	4 18.7	4 12.1					
½ Differ.	79 33 44.55	38 40.7	38 47.7	38 42.08					

Half Difference by Mean of 4 Microscopes = true Alt. 79° 38′ 43″.75
Apparent Obliquity ..... = 23 27 33.1

Latitude 33 48 49.35

Remarks.—The same Reductions to Solstice and Corr. for Sun's Latitude as above, have been applied to the following, but no Correction for Polar point.

3. Southern Solstice, December 1828, observed alternately direct and by Reflection, with the Repeating Circle.

1828.	True Zenith Distance of Sun's apparent place.	Reduction to Solstice.	Correction for Sun's Latitude.	True Zenith Distance of Tropic of Capricorn.
Dec. 14	10° 35′ 17.″34	−14′ 2.″37	−0.″32	10° 21′ 14.″65
15	„ 31 53.9	10 38.92	−0.19	„ 21 14.80
16	„ 29 1.96	7 43.36	−0.05	„ 21 18.55
17	„ 26 34.9	5 15.73	+0.08	„ „ 19.25
18	„ 24 29.9	3 16.41	0.24	„ „ 13.73
19	„ 22 56.43	1 45.20	0.38	„ „ 11.61
20	„ 21 54.93	42.15	0.50	„ „ 13.28
21	„ 21 19.77	7.48	0.59	„ „ 12.88
				10 21 14.83
Both Nutations				−9.8
Mean Zenith Distance of Tropic of Capricorn				10 21 5.03
Mean Obliquity				23 27 42.78
Latitude				33 48 47.81

Latitude of the Observatory, by Observations direct and by Reflection, of Stars made with the Mural Circle.

Sirius.

1823.	Barom.	Therm.	Observations.	Micrometer not corrected. I.	II.	III.	IV.	Refraction.
	inches.							
Feb. 17	29.92	70.2	direct	111° 26′ 16.″49	27′ 14.″2	26′ 55.″7	26′ 38.″9	″ 16.3
18	29.97	71.0	by reflect.	256 46 56.5	47 49.4	47 47.5	47 26.9	
Horizon = half Sum				184 6 36.5	7 31.8	7 21.6	7 2.9	
Apparent altitude = half Differ.				72 40 20.0	40 17.6	40 25.9	40 24.0	
Mean of the 4 Microscopes							72° 40′ 21.″9	
Refraction							— 16.3	
True Altitude							72 40 5.6	
True Declination							16 28 50.6	
Latitude							33 48 45.0	

Canopus (Mean of several Observations about February 21).

1823.	Barom.	Therm.	Observations.	Micrometer not corrected. I.	II.	III.	IV.	Refraction.
	inches.	°		° ′ ″	′ ″	′ ″	′ ″	″
Feb. 21	30.00	69.3	direct	75 19 27.8	20 22	19 57.4	19 47.1	18.9
	29.83	74.5	by reflect.	292 53 49	54 38.7	54 25.3	54 11.8	18.5
	Half sum = Horizon			184 6 38.1	7 30.1	7 11.15	6 59.2	
	Half Diff. = Altitude			71 12 49.4	12 51.65	12 46.05	12 47.65	

From Mean of 4 Microscopes. True Alt. 71° 12′ 29″.99. True Dec. 52° 36′ 20″.75.
Lat. 33° 48′ 50″.7.

2 α Centauri and β Centauri.

1826.	Barom.	Therm.	Star observed.	S. Pol. Dist. corrected for Polar point. I.	II.	III.	IV.
	inches.	°		° ′ ″	′ ″	′ ″	′ ″
June 20	30.02	43	β Centauri by reflect.	261 53 53.6	53 46.2	54 2.0	54 7.5
		42	2 α Centauri by reflect.	262 28 36.6	28 42.2	28 49.5	28 48.1
21	29.80	58	β Centauri direct	30 28 21.1	28 19.9	28 23.7	28 20.6
		57.5	2 α Centauri direct	29 53 32.1	53 28.2	53 35.7	53 29.9
22	29.93	53	β Centauri by reflect.	261 53 52.6	54 0.2	53 58.7	54 0.4
		47	2 α Centauri	262 28 39.6	28 46.7	28 46.5	28 46.4
23	29.98	44	β Centauri direct	30 28 23.6	28 16.2	28 29.5	28 22.6
			2 α Centauri	29 53 30.6	53 30.2	53 36.5	53 34.4
24	29.70	48	β Centauri by reflect.	261 53 54.6	53 58.2	54 3.9	54 3.0
		47	2 α Centauri	262 28 38.6	28 39.2	28 46.7	28 48.5

		Barom.	Therm.	Mean of 4 Micros.
		inches.	°	° ′ ″
Hence mean of the	Observat. of β Centauri direct	29.89	51	30 28 22.13
	Do. Do. Do. by reflect....	29.88	48	261 53 58.4
	Half Sum = Horizon			326 11 10.25
	Supplement = Latitude			33 48 49.75
Hence mean of the	Observat. of 2 α Centauri direct.....	29.89	51	29 53 32.7
	Do. Do. Do. by reflect..	29.88	45.3	262 28 44.9
	Half Sum = Horizon			326 11 8.85
	Supplement = Latitude			33 48 51.15

2 α Centauri.

1826.	Barom.	Therm.	Stars observed.	S. Pol. Dist. corrected for Polar point. I.	II.	III.	IV.	Refraction.
	inches.	°		° ′ ″	′ ″	′ ″	′ ″	
July 11	29.74	43	direct	30 34 17.0	34 9.6	34 16.0	34 18.0	
13	30.06	46.5	direct	„ 34 17.0	„ 8.0	.....	.....	
14	30.17	39.0	by reflect.	263 9 25	9 26.0	9 31.0	9 37.3	
15	30.13	42	by reflect.	„ 9 25	„ 25	„ 28.0	„ 38.3	
17	30.08	38	by reflect.	„ 9 32	„ 36	„ 33.5	„ 39.0	
19	30.10	46	direct	30 34 12	34 5.7	34 14.8	34 16.0	
25	29.84	46	direct	„ 34 17	„ 13.5	„ 18.0	„ 20.5	
17	29.93	45.4	direct	30 34 15.8	34 9.2	34 16.3	34 13.6	28.65
Mean 15.3	30.13	39.7	by reflect.	263 9 27.3	9 29.0	9 30.8	9 38.2	

Half Differ. by a mean of the 4 Microscopes	116	17 38.8
Middle of the Refraction	„	„ 28.65
True Zenith Distance	26	18 7.45
Apparent Declination	60	6 54.17
Latitude	33	48 46.72

Canopus.

1826.	Barom.	Therm.	Stars observed.	S. Pol. Dist. corrected for Polar point. I.	II.	III.	IV.	Refraction.
	inches.	°		° ′ ″	′ ″	′ ″	′ ″	
March 4	29.71	82	direct	37 37 23	37 23	37 36.5	37 30.3	
5	29.51	66	by reflect.	255 12 14.7	12 36.2	12 32.7	12 35.0	
8	29.89	62.5	by reflect.	„ 12 14.7	12 33.0	12 29.0	12 28.4	
11	29.92	66.5	by reflect.	„ 12 11.0	12 29.3	12 27.7	12 24.2	
12	29.98	67.2	direct	37 37 1.8	37 16.0	37 21.6	37 11.0	
13	29.88	71.0	by reflect.	255 12 14.0	12 33.8	12 26.5	12 3.3	
14	29.87	77	direct	37 37 7.3	37 15.0	37 24.3	37 10.3	
16	30.19	68	direct	„ 37 11.2	37 15.0	37 21.1	37 11.0	
18	30.06	81	direct	„ 37 7.0	37 13.5	37 25.5	37 13.9	
12.8	29.96	75.04	direct	37 37 10.06	37 13.9	37 25.8	37 13.3	18.6
9.2	29.80	66.5	by reflect.	255 12 13.6	12 33.1	12 29.0	12 22.7	18.87

Half Differ. by a mean of the 4 Microscopes	108	47	34.42
Middle of the Refraction		+	18.7
	108	47	53.12
True Altitude	71	12	6.88
Apparent South Polar Distance	37	23	14.67
Latitude	33	48	52.2

β Crucis.

1826.	Barom.	Therm.	Stars observed.	S. Pol. Dist. corrected for Polar point. I.	II.	III.	IV.	Refraction.
	inches.	°		° ′ ″	′ ″	′ ″	′ ″	
July 3	29.69	56	direct	31 28 31.5	28 33	28 36.7	28 34.5	
5	30.134	58.5	direct	„ 28 32.0	28 35	28 38.3	28 35.0	
6	30.20	49.2	direct	„ 28 32.2	28 34	28 39.8	28 39.0	
10	29.815	57.0	by reflect.	261 20 30.4	20 37.5	20 29.0	20 41.0	
11	30.035	48.5	by reflect.	„ 20 25.7	20 34.3	20 27.0	20 35.0	
12	29.980	51	direct	„ 28 34.0	28 33.0	28 37.0	28 34.0	
14	29.96	49	direct	„ 28 32.0	28 39.2	28 36.0	28 35.0	
Means { 8	29.993	52.74	direct	31 28 32.34	28 34.8	28 37.6	28 35.5	26.96
Means { 10.5	29.925	52.7	by reflect.	261 20 28.05	20 35.9	20 28.0	20 38.0	

	°	′	″
Half Difference by a mean of the 4 Microscopes	114	55	58.71
Middle of the Refraction	„	„	26.96
	114	56	25.67
True Zenith Distance	24	56	25.67
Apparent Declination	58	45	13.40
Latitude	33	38	47.73

Each of these observations separately gives the points of the division of the mural circle answering to the horizon, so that the latitude may be derived from every observation made at those periods on stars of a known declination.

The southern solstice, December 1827, observed alternately direct and by reflection with the repeating circle, whereof the abstract is given page 39, gives for the

	°	′	″
Mean Zenith Distance of the Tropic of Capricorn	10	21	4.2
Mean Obliquity of the Ecliptic	23	27	43.3
Latitude	33	48	47.5

Summing up, therefore, the latitudes found by observations alternately direct and by reflection, we have

	Latitude. °	′	″
By Solstice, December 1827, with Repeating Circle	33	48	47.50
Near the same Solstice, six observations with Mural Circle	„	„	52.10
Solstice, December 1828, with Repeating Circle	„	„	47.81
Ditto Ditto Mural Circle	„	„	49.35

	Latitude.		
	°	′	″
Feb. 1823, Sirius.—Two observations mural circle	33	48	45.00
———, Canopus	„	„	50.74
June 1826, β Centauri	„	„	49.75
———, 2 α Centauri	„	„	51.15
July 1826, 2 α Centauri	„	„	46.72
March 1828, Canopus	„	„	52.20
July 1828, β Crucis	„	„	47.73
Mean of all the latitudes observed alternately direct and by reflection	33	48	49.1

And assembling all the observations for the latitude, we find

	°	′	″
With Repeating Circle, by repetitions on stars north and south of zenith	33	48	51.72
Ditto without repetitions Ditto	„	„	48.55
With Mural and Repeating Circle alternately direct and by reflection	„	„	49.10
Latitude of the Observatory at Paramatta	33	48	49.79

III. *Longitude of the Observatory.*

The great distance of the meridian of the Observatory at Paramatta from that of any other established Observatory, renders the determination of its longitude more than usually difficult. Corresponding observations of occultations and eclipses cannot be obtained, so that the longitudes deduced from this kind of observations must depend upon the correctness of the lunar tables, and must therefore deviate from the truth considerably more than they would were they compared with corresponding observations. On the same account the uncertainty of the moon's horary motion during intervals of fifteen hours and upwards, must introduce inaccuracies in the longitudes derived from the transits of the moon and stars in her parallel, even if compared with corresponding observations made in Europe.

The number of observations instituted for the longitude is, however, sufficiently great to establish this point with nicety when they are all computed. In a geographical view, the longitude of Paramatta and Sydney is well enough known already; and in an astronomical view, the longitude is an object of much less importance than the latitude.

1. Lunar Observations.

The following distances of the sun from the moon were observed by Sir

Thomas Brisbane, K.C.B. and myself, and are carefully calculated upon the hypothesis of $\frac{1}{303}$ of the earth's flatness.

1821.	Apparent Time at Paramatta.	Apparent Altitudes Sun's Centre.	Apparent Altitudes Moon's Centre.	Apparent Distances of Centres.	Longitude East from Greenwich.
Nov.	h m s	° ′ ″	° ′ ″	° ′ ″	° ′ ″
15	20 15 59.5	38 11 6	27 9 30	98 36 50.3	10 4 10.0
	20 23 17.5	39 42 0	26 10 6	34 18.9	„ 4 21.0
16	19 30 30.9	28 50 36	41 0 12	87 5 37.0	„ 3 57.0
	19 34 49.7	29 45 2	40 41 58	87 4 35.0	„ 4 24.7
18	21 10 45.5	49 52 12	50 18 26	63 56 50.5	„ 3 31.0
	21 16 16.5	50 59 40	49 41 29	63 55 36.2	„ 4 16.5
	21 43 27.0	56 49 2	47 35 54	63 47 20.5	„ 3 11.0
19	21 20 53.9	52 3 38	58 23 9	52 52 54.7	„ 4 26.9
	21 18 12.4	53 32 48	57 44 31	52 51 1.8	„ 5 17.4
	21 35 32.4	55 1 00	57 4 28	52 48 51.0	„ 3 26.4
	21 47 39.8	57 28 0.0	55 41 5	52 45 22.5	„ 4 3.4
	21 51 47.0	58 16 0.0	55 16 47	52 44 11.0	„ 3 0.4
	21 56 41.4	59 14 30.0	54 39 18	52 43 12.0	„ 5 1.4
				Mean..	10 4 5.0

2. Eclipses of Jupiter's Satellites.

1821.	December	8.	Emersion of	I.	Satellite	12h 20m 25s.5	Mean Time at Paramatta.
		14.	.....	II.	Satellite	12 5 13.3	
1822.	January..	8.	.....	II.	Satellite	9 11 42.8	
		9.	.....	I.	Satellite	9 1 17.2	
	August ..	16.	Immersion..	II.	Satellite	15 21 44.85	
		16.	.....	I.	Satellite	18 16 31.8	
	December	13.	Emersion..	I.	Satellite	10 13 55	

3. Occultations of fixed Stars and Eclipses of the Sun by the Moon.

Year.	Day of the Month.	Star's Name.	Phase.	Mean Time at Paramatta.
				h m s
1821.	Dec. 14	ε Leonis	Immers....	14 47 9.1
			Emersion	15 45 57.0
	29	7.8 Magnit.	Immers....	8 36 47.0
	29	7.8	Immers....	8 46 47.0
1822.	Jan. 16	7.8 Mag. Canceris	Immers....	16 8 6.9
		6.7 Canceris	Immers....	16 54 19.9
	March 28	7 Tauri.....	Immers....	6 54 30.2
	30	5.6 Geminorum ...	Immers....	9 19 28.5
	April 1	6 Anon.	Immers....	8 58 21.8
	10	Antares	Immers....	18 35 47.4
			Emersion	19 14 27.9
				Sidereal Time.
	July 11	5.6 Mag.	Immers....	2 1 0.4
				Mean Time.
	Aug. 16	Sun	Beginning	19 35 36.32
			End	22 8 40.6
				Sidereal Time.
	Oct. 22	✳ Sagittarii.....	Immers....	22 29 9.8
1823.	Jan. 20	1 ♑ Arietis	Immers....	5 47 55.75
	Feb. 4	Antares	Immers....	17 56 9.88
			Emersion	19 17 57.38
	March 21	82 Geminorum ...	Immers....	9 52 11.6

Year.	Day of the Month.	Star's Name.	Phase.	Sidereal Time at Paramatta.
				h m s
1826.	Dec. 23	Spica	Immers....	11 27 42
	Nov. 6	Anon.	Immers....	23 49 20.5
	July 17	μ 2 Sagittarii	Immers....	19 1 0.0
1827.	Oct. 23	Anon.	Immers....	22 27 20.2

Occultation of Jupiter by the Moon.

1828.	June 24	4th Satellite ...	Immers.	Cloudy.
		3rd Satellite ...		12 47 28.5
		2nd Satellite ...		„ 50 36.5
		1st Limb of ♃ ...		„ 54 31.5
		1st Satellite.....		„ 55 56.5
		2nd Limb of ♃ ...		„ 56 33.8
		1st Limb of ♃ ...	Emers.	14 5 19.5
		2nd Limb of ♃ ...		„ 7 30.5

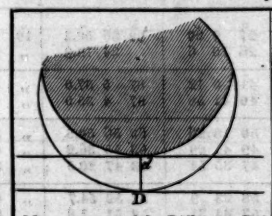
It was too cloudy during the Emersion to see the Satellites.

	Oct. 8	Sun	Begin.	21 0 37.0
			End. ...	22 50 13.8

Micrometrical Mensurations during the Solar Eclipse's Transit of ☿ &c. &c.

Eclipse of the Sun observed August 16, 1822, at Paramatta.

	h	m	s	
Beginning	5	14	30	Sidereal Time.
End	7	47	54.3	



Measurement of the Difference D*d* of Declination between the Sun's and Moon's Southern Limbs.

Sidereal Time.	Dd.
h m s	′ ″
6 2 53	13 39.6
„ 4 9	13 25.2
„ 4 50	13 15.5
„ 5 23	13 6.4
„ 6 2	13 6.4
„ 6 45	12 56.5
„ 7 14	12 49.3
„ 7 47	12 43.4
„ 8 25	12 42.8
„ 9 6	12 25.8
„ 10 11	12 18.0
„ 10 54	12 8.2
„ 11 31	11 58.4
„ 12 15	11 46.7
„ 12 49	11 45.5
„ 13 34	11 31.6
„ 14 31	11 23.8
„ 15 14.0	11 14.0
„ 15 51	11 13.4
„ 16 42	11 1.0
„ 17 31	10 49.9
„ 18 9	10 42.6
„ 18 52	10 29.9
„ 19 27	10 29.6
„ 20 1	10 18.7
„ 20 56	10 13.3
„ 21 46	10 5.4
„ 22 14.0	9 55

Measurement of the Chords.

Sidereal Time.	Chord.
h m s	′ ″
7 6 40	25 57
„ 7 46	25 46
„ 8 21	25 37
„ 9 9	25 17
„ 10 4	25 10
„ 11 1	24 54
„ 12 1	24 35
„ 13 55	24 17
„ 14 58	23 55
„ 15 38	23 36
„ 17 20	22 58
„ 18 16	22 46
„ 18 53	22 33
„ 19 46	22 22
„ 20 16	22 11
„ 20 49	22 0
„ 21 37	21 43
„ 22 15	21 30
„ 23 20	21 10
„ 24 55	20 25
„ 25 55	19 59
„ 26 48	19 45
„ 27 33	19 25
„ 28 18	19 15
„ 30 28	18 40
„ 30 4	18 19
„ 31 7	17 54
„ 31 50	17 29
„ 32 51	16 58
„ 33 47	16 34
„ 35 34	15 55
„ 35 50	15 24.5
„ 37 37	14 15.5
„ 38 17	13 47.5
„ 38 57	13 18
„ 39 46	12 55
„ 40 28	12 16.7
„ 41 5	11 45.3
„ 41 38	11 10.1
„ 42 12	10 33.5
„ 42 45	10 4.8
„ 43 22	9 26.2
„ 43 58	8 54.2
„ 44 39	8 0.7

		°	′	
This eclipse will have been total at Cape Bedford in	lat.	15	27	S.
	and long.	145	30	E.

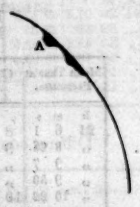
Solar Eclipse, October 8, 1828.

	h	m	s	
Beginning	21	1	37	uncert. } Mean Time at Paramatta.
End	22	50	13.8	

Mean Time at Paramatta.	Chord in Area.	Mean Time at Paramatta.	Chord in Area.	Mean Time at Paramatta.	Chord in Area.	Mean Time at Paramatta.	Chord in Area.
h m s	′ ″	h m s	′ ″	h m s	′ ″	h m s	′ ″
21 6 1	8 31.37	21 36 14	17 2.07	21 59 36	17 39.96	22 19 54	15 46.33
„ 8 26	9 14.47	„ 36 45	„ 2.07	„ 59 57	„ 39.96	„ 20 34	„ 39.14
„ 9 7	„ 36.02	„ 37 21	„ 2.73	22 0 17	„ 37.36	„ 21 17	„ 31.30
„ 9 50	„ 46.50	„ 37 47	„ 2.63	„ 0 42	„ 37.36	„ 22 35	„ 16.29
„ 10 22	10 17.17	„ 38 27	„ 5.35	„ 1 27	„ 37.36	„ 23 31	„ 15.84
„ 10 57	„ 30.89	„ 39 4	„ 5.35	„ 2 30	„ 36.70	„ 24 3	14 59.29
„ 11 24	„ 48.85	„ 39 39	„ 4.05	„ 3 4	„ 36.70	„ 24 42	„ 39.29
„ 11 55	„ 56.36	„ 40 18	„ 15.79	„ 3 52	„ 32.79	„ 25 25	„ 35.79
„ 12 24	11 11.37	„ 40 47	„ 15.79	„ 5 2	„ 36.70	„ 26 13	„ 35.13
„ 12 55	„ 29.66	„ 41 4	„ 15.14	„ 5 48	„ 30.17	„ 26 47	„ 24.69
„ 14 8	„ 55.78	„ 41 37	„ 17.74	„ 6 19	„ 20.38	„ 27 21	„ 18.82
„ 14 59	„ 55.78	„ 42 29	„ 34.07	„ 6 45	„ 21.00	„ 27 50	„ 18.82
„ 15 34	12 23.21	„ 43 4	„ 31.48	„ 7 18	„ 21.0	„ 28 22	„ 6.41
„ 16 10	„ 39.54	„ 43 35	„ 33.42	„ 7 52	„ 16.46	„ 28 50	13 54.34
„ 17 2	13 5.00	„ 44 23	„ 28.87	„ 8 12	„ 16.46	„ 29 13	„ 50.73
„ 17 40	„ 5.0	„ 45 59	„ 30.83	„ 8 57	„ 9.27	„ 29 44	„ 48.77
„ 18 10	„ 15.47	„ 46 37	„ 37.35	„ 9 30	„ 0.12	„ 30 14	„ 30.48
„ 19 5	„ 34.41	„ 47 14	„ 40.62	„ 10 0	„ 0.12	„ 30 40	„ 30.48
„ 20 19	„ 57.27	„ 47 47	„ 40.62	„ 10 25	16 55.55	„ 31 27	„ 16.77
„ 21 4	14 3.78	„ 48 29	„ 40.62	„ 11 0	„ 55.55	„ 32 10	12 57.18
„ 21 38	„ 7.7	„ 49 12	„ 43.22	„ 11 52	„ 49.02	„ 32 52	„ 49.35
„ 22 57	„ 41.66	„ 49 44	„ 49.99	„ 12 22	„ 49.02	„ 33 28	„ 39.54
„ 23 36	„ 41.66	„ 50 26	„ 50.41	„ 12 59	„ 36.60	„ 35 25	„ 1.01
„ 24 19	„ 50.17	„ 51 15	„ 45.2	„ 13 35	„ 31.38	„ 35 49	11 35.54
„ 25 0	15 9.75	„ 51 42	„ 45.18			„ 37 47	„ 21.16
„ 25 26	„ 9.75	„ 52 37	„ 47.80	„ 14 6	„ 31.38	„ 40 11	10 6.07
„ 26 7	„ 22.15	„ 53 49	„ 51.72	„ 14 28	„ 23.54	„ 40 0	9 43.87
„ 26 56	„ 39.14	„ 54 28	„ 45.84	„ 14 52	„ 22.25	„ 42 12	„ 24.36
„ 27 42	„ 35.22	„ 55 7	„ 47.80	„ 15 23	„ 23.54	„ 43 17	„ 33.03
„ 30 47	16 17.01	„ 55 39	„ 47.80	„ 15 55	„ 23.54		
„ 32 7	„ 18.32	„ 56 24	„ 47.8	„ 16 31	„ 19.63		
„ 33 12	„ 26.94	„ 57 17	„ 47.8	„ 17 9	„ 16.36		
„ 33 52	„ 27.46	„ 57 53	„ 47.14	„ 17 47.0	„ 3.96		
„ 35 22	„ 39.89	„ 58 40	„ 39.31	„ 18 27	15 58.74		
„ 35 47	„ 43.79	„ 59 12	„ 39.96	„ 19 21	„ 50.24		

Remarks on the preceding Eclipse.

Before the end of the eclipse I distinctly saw, on that part of the sun from which the moon parted, this appearance, which could have only arisen from projecting points on the moon's surface.



The vanishing of the last black spot A was equal to the immersion of a fixed star.

Owing to the oblique direction in which the moon traversed the sun, the diminution of the shade was very slow, so that this eclipse is not well qualified for deducing the geographic longitude, which would be greatly influenced by any small error of the moon's tables in latitude, or an erroneous assumption of the ratio of the earth's axes. Whereas, on the contrary, this ratio might with considerable accuracy be deduced from the preceding micrometrical measurements, if compared with any corresponding observations made in any part of Asia.

I take this opportunity of recording the transit of Mercury over the sun's disk, as observed by me the 5th November, 1822.

	h m s		h m s	Sid. Time.
Immersion of ☿'s first limb	13 59 27.0	Emersion of first limb	16 44 23	
Complete Immersion	14 2 8	Complete Emersion ..	16 47 22	———
The sun's centre passed over the meridian at			14 38 39.41	———
Mercury culminated			14 38 29.9	———

The declination of ☿ observed with the mural circle whilst the planet passed upon the sun's disk over the meridian was,

	° ′ ″
	15 43 49.24
Refraction	— 17.80
	15 43 31.44

Parallax is not applied.

I subjoin the micrometrical observations; first in right ascension, or the passages over the middle wire of the micrometer of the sun's limb and centre of ☿ in sidereal time.

Sun's 1st Limb.	Mercury.	Sun's 2d L.	Sun's 1st Limb.	Mercury.	Sun's 2d L.	Sun's 1st Limb.	Mercury.	Sun's 2d L.
h m s	m s	m s	h m s	m s	m s	h m s	m s	m s
14 2 4.65	3 58	5 2.5	14 27 40	28 42.5	29 55.5	15 8 30.7	9 18.2	10 46.2
„ 5 56.5	7 7	8 12.5	„ 44 2.7	44 58.5	46 27.7	„ 11 50.2	12 37.7	.....
„ 8 46.5	9 56	11 2.0	„ 47 10	48 5.0	49 26.0	„ 15 13.7	15 59.2	17 30.2
„ 11 43.5	12 52	13 59.5	„ 49 55	50 50	52 11	„ 18 12.7	18 56.7	.....
„ 14 51.2	15 58.5	17 6.5	„ 55 4.3	50 57	57 19.7	„ 21 59.9	22 42.7	.....
„ 17 45	18 51	20 0.5	„ 57 58.7	58 50.7	0 14.7	„ 24 18.2	25 0.7	.....
„ 22 39.7	23 46	.....	15 0 57.2	1 48.2	3 12.7	„ 26 42.4	28 23.9	.....
„ 24 31	25 35	26 46.5	„ 5 25.7	6 14.7	7 41.2			

Sun's 1st Limb.	Mercury.	Sun's 1st Limb.	Mercury.	Sun's 1st Limb.	Mercury.	Sun's 1st Limb.	Mercury.	Sun's 1st Limb.	Mercury.
h m s	′ ″	h m s	′ ″	h m s	′ ″	h m s	′ ″	h m s	′ ″
15 28 37.3	29 17.7	15 48 53.5	49 26	16 1 3.0	1 31.2	16 13 18.5	13 42.5	16 26 1.1	26 21.1
„ 32 56	33 35	„ 51 9.5	51 41.5	„ 3 29.3	3 57.0	„ 15 9.2	15 32.2	„ 28 5.1	28 24.1
„ 35 45.2	36 22.5	„ 51 28.2	53 0.5	„ 5 49.7	6 16.5	„ 17 28.8	17 51.1	„ 30 54.6	30 11.1
„ 38 49.0	40 25.5	„ 54 34	55 4.7	„ 7 57.8	8 23.5	„ 19 31.2	19 53.2	„ 31 54.1	32 11.1
„ 44 38.5	45 10.0	„ 56 19.5	56 49.5	„ 11 23.5	11 48.3	„ 23 58.1	24 16.1	„ 36 10.1	36 26.1
„ 45 22.5	46 56.5	„ 58 54.5	59 23.9						

Differences of Declinations of the Planet and Sun's Southern Limb.

Sidereal Time.	Diff. of Declin.	Sidereal Time.	Diff. of Declin.	Sidereal Time.	Diff. of Declin.	Sider. Time.	Diff. of Declin.	Sider. Time.	Diff. of Declin.
h m s	″	h m s	′ ″	h m s	′ ″	h m s	′ ″	h m s	′ ″
14 5 56.5	23.84	14 48 30	2 10.4	15 22 18	3 44.1	15 51 56	4 58.3	16 23 7	6 9.5
„ 7 7	30.82	„ 50 25	2 13.5	„ 23 4	3 42.8	„ 53 16	4 52.5	„ 24 39	6 16.0
„ 9 2	31.49	„ 51 11	2 11.4	„ 24 17.5	3 38.0	„ 55 20	5 5.9	„ 25 5	6 13.7
„ 12 2	35.85	„ 53 10	2 24.0	„ 25 41	3 50.1	„ 57 13	5 14.1	„ 26 41	6 19.9
„ 12 36	40.69	„ 53 51	2 23.4	„ 26 41.7	3 46.4	„ 59 39	5 12.6	„ 28 41	6 32.3
„ 13 12	42.78	„ 54 22	2 24.5	„ 27 48	3 49.3	16 0 15	5 18.7	„ 29 14	6 31.1
„ 15 26	42.25	„ 55 29	2 38.2	„ 28 36.6	3 50.5	„ 1 55	5 25.5	„ 30 31	6 28.1
„ 16 24	43.11	„ 56 30	2 36.0	„ 31 12	4 2.8	„ 2 22	5 26.7	„ 31 4	6 29.1
„ 18 4	52.25	„ 59 24	2 41.5	„ 31 55	4 4.1	„ 4 14	5 32.1	„ 32 36	6 35.5
„ 18 28	55.51	15 1 15	2 44.5	„ 33 13	4 10.0	„ 4 47	5 31.3	„ 36 39	6 47.6
„ 19 10	1 0.28	„ 2 8	2 44.6	„ 33 52	4 11.1	„ 6 32	5 25.4	„ 37 39	6 54.8
„ 21 12	1 3.35	„ 5 26	2 57.8	„ 34 24	4 14.8	„ 9 44	5 37.1	„ 38 19	6 57.5
„ 23 2	1 16.09	„ 6 36	3 0.2	„ 36 7	4 16.5	„ 12 9	5 45.0	„ 39 5	6 55.9
„ 24 54	1 10.34	„ 8 31	3 4.8	„ 36 51	4 17.5	„ 14 6	5 51.8	„ 39 44	7 1.3
„ 26 4	1 14.45	„ 9 40	3 7.6	„ 39 3	4 19.7	„ 15 49	5 59.0	„ 40 31	7 2.3
„ 27 59.7	1 21.12	„ 12 10	3 20.7	„ 40 58	4 29.3	„ 16 21	6 0.0	„ 41 13	7 2.5
„ 29 0.7	1 25.42	„ 13 11	3 21.4	„ 41 14	4 29.9	„ 18 6	5 56.7	„ 41 58	7 8.4
„ 44 18.7	1 59.2	„ 15 14	3 18.7	„ 43 15	4 35.4	„ 18 32	5 58.9	„ 42 26	7 8.4
„ 45 17	2 2.0	„ 16 18	3 21.7	„ 43 52	4 35.9	„ 20 16	6 9.5		
„ 46 51	2 2.2	„ 18 12	3 28.1	„ 47 16	4 44.6	„ 20 45	6 12.0		
„ 47 32	2 9.9	„ 19 23	3 25.9	„ 49 47	4 49.3	„ 22 33	6 11.6		

Lunar Eclipses observed at Paramatta.

Lunar Eclipse, January 26, 1823.

Number and Name of spot.	Immersions. Enters the shade. Mean Tim.	Is perfectly eclipsed. Mean Tim.	Number and Name of spot.	Emersion. Mean Tim.
	h m s	h m s		h m s
2 Gallileus	13 48 13		5 Gassend.	16 30 35
4 Kepler.	„ 51 50		4 Kepler.	„ 31 15
3 Aristar.	„ 53 48	13 54 45	24 Manilius	„ 50 35
14 Bulliald.	„ 55 13		25 Menel.	„ 53 11
10 Reinold.	„ 58 32		28 Dion. . .	„ 55 21
11 Coperni.	„ 59 10	14 0 5	29 Plinius	„ 57 38
21 Ticho.	14 0 48		27 Posidon.	„ 59 33
16 Timoch.	„ 10 25	„ 11 39		
18 Archim.	„ 13 55			
24 Manil. . .	„ 14 29	„ 14 55		
17 Plato . .	„ 14 42	„ 15 45		
28 Dion. . .	„ 16 21	„ 16 26		
25 Menela.	„ 17 33			
29 Plinius	„ 20 35			
22 Eudoxus	„ 21 45			
23 Aristot.	„ 22 21			
32 Censor.	„ 23 38			

Lunar Eclipse, May 21, 1826.

Spot.	Immersion. Mean Tim.	Spot.	Emersion. Mean Tim.
	h m s		h m s
Beginning	11 37 37	1 Grimald.	14 5 43
2 Gallileus	„ 39 18	2 Gallileus	„ 8 43
1 Grimald.	„ 41 30	5? Gassen.	„ 9 30
3 Aristar.	„ 41 30		„ 11 29
7 Harpal.	„ 46 39	3 Aristar.	„ 14 48
5 Gassend.	„ 50 23	4 Kepler.	„ 15 29
9 Lansber.	„ 50 23	9 Lansber.	„ 18 7
10 Reinold.	„ 52 56	14 Bulliald.	„ 19 18
11 Coperni.	„ 52 56	21 Tycho.	„ 20 58
15 Eratosth.	„ 55 14	8 Heraclid.	„ 20 58
14 Bulliald.	„ 59 27	20 Pitatus	„ 22 13
19 In.sin.me.	12 0 37	7 Harpal.	„ 23 4
22 Eudoxus	„ 2 53	11 Coperni.	„ 23 58
23 Aristot.	„ 2 53	15 Eratosth.	„ 24 55
25 Manil. . .	„ 4 39	12 Helicon.	„ 25 51
20 Pitatus	„ 6 26	16 Timoch.	„ 28 41
25 Menela.	„ 7 54	19 In.sin.me.	„ 29 52
27 Posid. . .	„ 10 43	17 Plato . .	„ 31 23
29 Plinius	„ 11 11	31 Fracast.?	„ 37 16
21 Tycho.	„ 12 23	30 Teophi?	„ 37 16
32 Censori.	„ 18 5	24 Manil. . .	„ 38 19
30 Theoph.	„ 18 53	22 Eudoxus	„ 40 34
40 Tarunt.	„ 20 28	23 Aristot.	„ 40 34
31 Fracast.	„ 21 12	28 Dionis.	„ 41 30
39 Langr.	„ 29 17	25 Menela.	„ 41 30
38 Petaolus	„ 29 17	29 Plinius	„ 45 12
		31 Fracast.?	„ 46 34
		30 Theoph.?	„ 46 34
		27 Posidon.	„ 47 33
		32 Censor.	„ 48 43
		40 Tarunt.	„ 53 15
		34 Prom.So.	„ 53 15
		36 Cleome	„ 53 51
		35 Proclus.	„ 54 49
		39 Langre	„ 55 18
		End. . . .	15 1 54

Remark.—During the total eclipse (May 21, 1826,) the darkness was so complete, that occultations of stars of the eighth magnitude behind the eclipsed moon could conveniently be observed. I observed only one, as follows:

	h m s
Immersion	12 34 38
Emersion	12 48 41

The position of this star is about . { ☌ 236° 44′ ; Decl. 19 46

Aristarchus was towards the latter part of the eclipse as brilliant as a star of the first magnitude. In the beginning I found nothing particular about him.

Lunar Eclipse, November 14, 1826.

Immersions.			Emersions.			Immersions.			Emersions.		
Spot.	Sid. Time.		Spot.	Sid. Time.		Spot.	Sid. Time.		Spot.	Sid. Time.	
	h m s			h m s			h m s			h m s	
Beginning ..	3 37 16		End of total obscuration	6 21 27		28 Dionisi ..	4 19 9		16 Timocharis	6 45 56	
5 Gassendus	„ 43 20		1 Grimaldus	„ 25 8		18 Archim. ..	„ 19 9		18 Archimed.	„ 49 5	
2 Gallileus..	„ 43 47		2 Gallileus..	„ 26 13		17 Plato	„ 20 23		21 Tycho. ..	„ 51 25	
4 Keplerus	„ 51 25		3 Aristarch.	„ 28 57		25 Menela. ..	„ 21 22		22 Eudoxus	„ 53 1	
9 Lansber...	„ 52 53		8 Heraclides	„ 30 13		29 Plinius ..	„ 24 50		23 Aristoteles	„ 53 2	
14 Bulliald..	„ 53 53		7 Harpal. ..	„ 30 44		32 Censori. ..	„ 25 56		19 In. sin. m.	„ 54 3	
3 Aristarch.	„ 56 8		4 Keplerus	„ 34 1		22 Eudoxus..	„ 27 52		24 Manilius..	„ 59 36	
21 Tycho. ..	„ 59 5		12 Helicon...	„ 37 53		23 Aristoteles	„ 29 7		28 Dionisius	7 1 46	
10 Reinold...	„ 59 5		9 Lansberg.	„ 39 42		27 Posidon...	„ 32 39		25 Menelaus	„ 4 24	
11 Copern...	4 1 15		11 Copernic. ..	„ 39 52		40 Taruntius	„ 33 34		27 Posidonius	„ 7 34	
15 Eratosth.	„ 4 35		10 Reinold...	„ 40 2		35 Proclus. ..	„ 35 30		29 Plinius ..	„ 7 57	
7 Harpal. ..	„ 7 38		14 Bulliald...	„ 41 10		26 Hermes ..	„ 35 48		33 Messala ..	„ 14 26	
12 Helicon...	„ 8 0		15 Eratosth.	„ 42 2		36 Cleomed.	„ 39 33		32 Censorinus	„ 14 48	
19 In. sin.med.	„ 11 54		17 Plato	„ 44 25		Beginning of total obscuration	„ 45 7		40 Taruntius	„ 19 14	
16 Timocha.	„ 16 25		14 Bulliald...	„ 45 22					35 Proclus. ..	„ 19 14	
24 Manilius..	„ 17 38								End of Eclipse	7 27 19	

Remark.—During the first part of total obscuration, Aristarchus was as dark as any other peak of the moon, but towards the end of it he began to be as brilliant as he was on the 21st of May. The effect of the moon's obscuration upon the visibility of the stars was remarkable.

Intervals between the Culminations of the Moon and those of Stars about the same Parallel.

Remark. — means that the Star precedes, + that he follows the Moon.

1822.	Stars.	Interval.	1822.	Stars.	Interval.
		m s			m s
May 10	φ Sagittarii	− 6 35.12	July 12	8 Arietis	− 3 9.53
	σ Sagittarii	+ 3 5.84		P. I. 243	+ 3 9.37
May 27	Regulus	− 7 40.65	July 25	Spica	− 16 2.50
May 31	Spica	+ 5 41.81	Aug. 12	β Tauri	− 29 1.61
June 1	Spica	− 40 52.2	Aug. 25	Antares	− 5 13.3
June 2	Anon.	− 12 45.03	Aug. 29	in Parallel	+ 2 5.81
	ρ Libræ	− 9 15.31		γ Capricorn.	+ 6 9.38
	μ Libræ	− 5 50.53	Sept. 19	Spica	− 62 20.84
June 29	Anon.	− 4 9.94		Antares	+120 21.19
June 30	12 Libræ	+ 18 41.75	Sept. 20	Antares	+ 69 29.87

1822.	Stars.	Interval.
Sept. 21	Antares	+ 16′ 44.29
Oct. 27	15 Piscium	− 5 1.1
	16 Piscium	− 4 4.78
Nov. 10	α Hydræ	− 36 38.75
	Spica	+ 19 19.4
Dec. 24	α Pegasi	− 19 34.13
1823.		
March 23	ξ Leonis	− 6 24.66
	ο Leonis	+ 2 53.44
	Regulus	+ 30 7.82
March 21	Castor	− 8 51.94
	Pollux	+ 2 18.78
	in Parallel	+ 6 30.12
1826.		
May 20	1 α Libræ	+ 1 13.15
	2 α Libræ	+ 1 24.34
June 13	H. C. 227	
	Declin. 1° 15′ S.	− 4 24.45
	Ibid. D. 0 45 S.	− 1 29.49
	H.C.150. D.3° 23′. S.	+ 5 24.26
June 14	γ Virginis	+ 18 25.1
June 16	κ Virginis	− 6 50.0
	ι Virginis	− 3 33.58
June 26	α Pegasi	− 58 59.33
	γ Pegasi	+ 9 11.97
June 27	ε Piscium	+ 11 54.55
June 28	η Piscium	− 7 10.27
June 29	α Arietis	− 20 24.66
July 13	Spica	− 33 14.93
	Decl. 16° 0′ S.	+ 4 19.64
	*Decl. 13 30 S.	+ 8 0.76
	Decl. 13 24 S.	+ 11 37.3
July 15	P. XV. 254	+ 3 57.66
	Decl. 23° 10′	+ 6 34.1
	Antares	+ 26 57.8
July 16	Antares	− 37 28.72
	Decl. 25° 18′	− 14 37.9

1826.	Stars.	Interval.
July 16	Decl. 23° 13′	− 11′ 53.67
	In parallel	− 5 16.73
	Eclipsed	− 0 25.67
	Decl. 20° 15′	+ 4 30.95
July 17	1 μ Sagittæ	+ 2 29.60
	2 μ Sagittæ	+ 3 59.80
	P. XVIII. 66	+ 16 22.27
July 24	P. 0 115	+ 4 1.8
	ε Piscium	+ 31 1.37
July 25	ε Piscium	− 16 35.79
	P. 0 287	− 13 5.98
	38 Mayer	− 8 8.55
	η Piscium	+ 11 39.83
July 26	γ Arietis	− 14 45.76
	23 Arietis Bod.	− 19 22.53
	In parallel	− 6 46.63
July 27	36 Arietis	− 13 32.46
	ο Arietis	− 13 6.08
	uncertain	− 9 32.14
	π Arietis	− 8 33.92
	Decl. 18° 26′ N.	− 7 16.49
	1 ρ Arietis	− 2 58.98
	53 Arietis	+ 9 28.65
Aug. 11	γ Libræ	− 5 58.35
	Decl. 22° 17′ S.	+ 3 43.47
	δ Scorpii	+ 18 17.4
	β Scorpii præcip.	+ 23 33.72
Aug. 12	β Scorpii præcip.	− 38 56.3
	Antares	− 15 30.86
Aug. 22	β Arietis	+ 5 58.22
	68 Mayer	+ 11 3.09
Sept. 16	ω Piscium	+ 7 5.83
Nov. 9	κ Piscium	+ 8 45.95
Dec. 12	36 Tauri	+ 8 32.1
	Decl. 18° 36′	+ 11 6.71
	Aldeb.	+ 40 30.502
	188 Tauri Bod.	+ 15 13.03
1827.		
Feb. 16	82 Virginis	− 7 30.73
	86 Virginis	− 3 19.08

1827.	Stars.	Interval.
March 17	γ Libræ	+ 6 43.95
	41 Libræ	+ 9 50.42
March 18	657 Mayer	+ 10 17.1
May 6	Sextarius	− 0 51.4
	58 Leonis	+ 14 43.27
May 7	P. XI. 166	+ 12 55.45
May 9	Spica	− 3 35.515
June 13	P. XXI. 190	+ 6 25.62
	ξ Aquarii	+ 8 42.38
July 3	m Virginis	+ 7 41.47
July 4	1 α Libræ	+ 19 0.505
	2 α Libræ	+ 19 11.905
Aug. 2	Anon.	+ 4 58.91
	P. XVI. 28	+ 6 7.05
	4 ψ Ophiuchi	+ 13 12.45
	χ Ophiuchi	+ 16 14.57
Aug. 3	P. XVI. 281	− 8 40.17
	——— 305	− 4 28.17
	ρ Ophiuchi	+ 6 5.82
Aug. 17	γ Geminorum	+ 19 37.19
Aug. 30	η Ophiuchi	+ 17 57.44
Aug. 31	P. XVII. 264	+ 1 51.32
Sept. 2	P. XIX. 384	+ 5 7.12
	——— 404	+ 8 1.43
Sept. 3	ν Aquarii	+ 9 8.77
Oct. 1	P. XXI. 162	− 4 15.78
	β Aquarii	
	Anon.	+ 5 1.05
	P. XXI. 258	+ 9 4.45
Oct. 29	60 Aquarii	+ 20 52.52
	Situla	+ 24 32.22
1828. Jan. 28	P. VI. 2	+ 8 36.33
	71 Orionis	+ 11 29.885
Jan. 29	271 Mayer	+ 3 0.897

1828.	Stars.	Interval.
Jan. 29	Mekbutha	+ 9 13.50
	279 Mayer	+ 11 36.63
Feb. 3	P. XI. 44	+ 20 18.05
	τ Leonis	+ 26 47.33
	v Leonis	+ 35 50.65
Feb. 5	$\varkappa^1$ Virginis	+ 21 17.05
	ϑ Virginis	+ 31 31.95
	Spica	+ 46 37.27
	m Virginis	+ 63 3.90
March 31	Moon's 1st Limb	− 2 9.05
	Moon's 2nd Limb	0
	46 Virginis	+ 5 53.01
	P. XII. 271	+ 12 25.65
	ϑ Virginis	+ 15 11.60
April 25	464 Mayer	+ 3 34.75
	α Leonis	+ 9 25.78
	65 Leonis	+ 15 53.10
April 26	i Leonis	− 2 55.91
	Zavijava	+ 10 39.87
	P. XI. 178	+ 13 57.87
May 23	Anon.	− 4 44.45
	75 Leonis	− 1 15.8
	τ Leonis	+ 9 23.53
	Zavijava	+ 32 2.28
May 25	ϑ Virginis	+ 12 9.7
May 27	1 ξ Libræ	+ 6 51.43
	P. XIV. 268	+ 18 57.25
June 21	P. XII. 208	+ 17 18.8
	1 k Virginis	+ 23 34.19
June 27	Moon's 1st Limb	0
	Moon's 2nd Limb	+ 2 26.58
	P. XVIII. 121	+ 8 34.03
	ϕ Sagittarii	+ 16 30.5
	d Sagittarii	+ 49 9.55
July 3	73 Piscium	+ 34 27.53
	80 e Piscium	+ 38 0.22
July 19	s Virginis	− 4 37.28
	o Virginis	+ 36 10.83
July 21	P. XIV. 268	+ 14 19.68

1828.	Stars.	Interval.	1828.	Stars.	Interval.
July 21	P. XIV. 280	+ 16 45.08	July 24	P. XVIII. 25	+ 22 48.54
	30 Libræ	+ 30 37.68		728 Mayer	+ 35 31.07
July 22	γ Libræ	— 5 37.05		P. XVIII. 91	+ 36 47.43
	δ Libræ	+ 4 1.13	Aug. 20	689 Mayer	+ 7 4.04
	49 Libræ	+ 10 39.55		266 Bod. Ophi.	+ 18 21.3
July 23	P. XVI. 251	+ 8 56.27	Aug. 21.	745 Mayer	+ 17 13.11
	29 Ophiuchi	+ 11 0.35		1 ξ Sagittæ	+ 28 28.60
	674 Mayer	+ 17 28.37		738 Mayer	+ 8 19.92
	γ Ophiuchi	+ 19 43.53			

It is necessary to remark that the intervals are not given with regard to the moon's centre; but before full moon with regard to her first, and after full moon with regard to her second limb.

Calculation of the Longitude from the preceding Observations.

The solar eclipse of the 16th August, 1822, gives according to my calculation, without allowance for inflexion and irradiation, for true conjunction by

Beginning . . . . . $21^h\ 25^m\ 55^s.32$
End . . . . . $25\ \ 42\ .40$ } Mean Time, Paramatta.

Professor Wurm, who has computed this eclipse, finds the true conjunction by

Beginning . . . $21^h\ 25^m\ 45^s.53 - 0.907\,x$
End . . . . . $00\ \ 25\ \ 52\ .77 \times 0.238\,x$

And after applying the corrections for the Moon's place... $\sigma = 21^h\ 25^m\ 55^s.88$.

From the occultation of Antares 10th April, 1822, Professor Wurm has calculated the corrected conjunction $17^h\ 29^m\ 18^s.25$. My calculation gives it $17^h\ 29^m\ 16^s.45$.

I found from the immersion of Antares 4th February, 1823, the true conconjunction $20^h\ 46^m\ 58^s.78 - 0^s.698\,x$. And Professor Wurm has found it $20^h\ 47^m\ 9^s.64 - 0''.72\,x$.

But Professor Wurm, to whose indefatigable exertions Geography is so much indebted, having calculated the occultations observed at Paramatta as far as he was in possession of them, and could identify the stars, I can do no better than give the results of his calculations in preference. The longitude deduced from Spica, 23rd December, 1826, is alone, by my calculation, this observation not having been as yet communicated to Professor Wurm. It is

however necessary to remark, that in the absence of corresponding observations, the longitudes rely upon the Lunar Tables, and can therefore be much vitiated by small errors in the position of the Moon as well as of the Stars.

Longitude of the Observatory at Paramatta, deduced from the Eclipses and Occultations of fixed Stars, by Professor WURM, of Stuttgard.

	Phenomena.	h	m	s	
1822. August 16th.	Eclipse of the Sun	10	4	6.99	Longitude.
1822. November 5th.	Transit of Mercury		4	3.96	
1821. December 14th.	2 ρ Leonis, Immersion doubtful		3	48.54	
1821. December 29th.	Anon. } from Professor BESSEL's Zones		4	5.08	
	Anon. }		3	56.19	
1822. January 16th.	64 Libræ, Immersion		3	43.68	
	65 Libræ, Immersion		3	50.05	
1822. April 1st.	80 Canceris, Immersion		4	6.24	
1822. April 10th.	Antares, Immersion and Emersion		3	59.45	
1822. July 11th.	75 Piscium, Immersion		4	0.97	
1823. January 20th.	15 Arietis, Immersion		4	3.66	
1823. February 4th.	Antares, Immersion		4	10.12	
1823. March 21st.	82 Geminorum, Immersion		4	5.97	
1826. December 23rd.	Spica, Immersion		4	3.80	

The following Occultations, observed by Sir THOMAS BRISBANE, have also been calculated by Professor WURM.

		′	″	
1824. 5th July	* Solitarii, Immersion	3	52.54	Longitude.
1824. 28th August	85 Virginis	4	8.97	
30th September	θ Sagittarii	4	7.66	
	σ Sagittarii	3	57.3	

The longitude of Paramatta, obtained from Lunar Distances, gave as above } 4′ 5″.0

Eclipses of Jupiter's Satellites . . . . . 4 22 .8

Amongst the Culminations of the Moon and fixed Stars observed in Europe and hitherto published, I found but a small number corresponding with those observed at Paramatta.

	′	″
Mr. FRANCIS BAILY has deduced, from an Observation made on the 30th of May, the Longitude of Paramatta	3	44.17
Professor NICOLAI found from the same Observation	3	49.00
Mr. CLAUSSEN from an Observation made on the 23rd of March, 1823, at Greenwich and Paramatta (Star Regulus), found	4	15.00
From an Observation made at Paramatta, 29th June 1826, and at Abo by Professor ARGELANDER (Star α Arietis), I find	3	52.16

From another corresponding Observation made at Abo, 9th Nov. 1826 (Star κ Piscium), I find 4 21.50

A corresponding Observation made by M. Dumouchel at the Collegio Romano, 8th May 1827 (Star Spica), gives me 4 16.30

As the uncertainty of the Moon's horary motion diminishes greatly the accuracy with which from corresponding observations of the Transits of the Moon and Stars, the difference of Longitude can be found, when this is great; and as moreover under these circumstances corresponding observations are rare, I have, in order to derive some benefit from all my observations, employed the method explained at the end of the Table.

Observed Right Ascensions of the Moon, and Longitude of the Observatory.

Day of the Month.	Apparent Time at Paramatta.	Moon's true Right Ascension from Observat^{y}.	Longitude of the Observatory.	Day of the Month.	Apparent Time at Paramatta.	Moon's true Right Ascension from Observat^{y}.	Longitude of the Observatory.
1822.	h m s	° ′ ″	h m s	1827.	h m s	° ′ ″	h m s
May 30	" " "	" " "	10 3 56.	Aug. 2	7 14 5.73	240 29 35.7	10 4 12.3
31	" " "	" " "	" 4 7.2	3	8 13 50.3	256 26 32.6	" 4 7.4
1826.				17	20 22 14.0	91 46 13.8	" 3 40.3
May 20	10 53 12.3	220 16 16.4	" 4 11.2	30	6 10 54.8	250 55 36.8	" 4 17.6
June 14	6 46 20.2	183 53 18.9	" 4 20.9	31	7 9 59.8	266 38 45.6	" 4 19.9
16	8 33 46.7	212 54 59.0	" 3 39.7	Sept. 2	9 7 45.1	297 58 13.2	" 4 28.6
26	17 35 15.3	358 31 50.1	" 3 56.6	3	10 4 18.4	313 2 45.6	" 4 29.2
27	18 17 54.1	10 15 44.4	" 3 57.2	Oct. 1	8 59 19.3	321 57 38.6	" 4 24.2
28	19 0 58.4	22 5 46.5	" 3 56.1	29	7 52 38.6	331 20 40.1	" 4 33.8
29	19 45 8.3	34 12 8.5	" 3 51.9	1828.			
July 13	6 21 21.5	207 36 39.7	" 4 25.4	Jan. 28	9 13 14.4	88 34 30.6	" 3 59.4
15	8 15 27.6	238 15 17.7	" 4 10.8	29	10 0 25.6	101 26 12.2	" 3 37.5
16	9 15 41.3	254 22 2.3	" 4 13.7	Feb. 3	13 46 57.7	162 49 57.9	" 3 58.6
17	10 16 7.0	270 31 26.6	" 4 3.8	5	15 15 51.2	187 7 55.3	" 4 3.8
24	16 9 9.3	5 28 53.1	" 3 45.6	Mar. 31	12 6 2.89	191 12 59.8	" 3 52.7
25	16 52 42.3	17 23 25.3	" 3 51.3	April. 25	8 30 48.5	160 49 14.2	" 4 20.3
26	17 36 4.0	29 26 54.6	" 3 50.5	26	9 15 45.3	173 1 50.5	" 4 1.2
27	18 22 10.8	41 47 35.5	" 4 1.2	May 23	7 9 31.2	167 40 58.9	" 4 16.5
Aug. 11	6 9 50.13	233 14 40.8	" 4 0.1	25	8 40 24.8	192 29 34.4	" 4 8.1
12	7 8 23.8	248 52 20.1	" 4 3.7	27	10 21 21.1	219 50 5.9	" 4 1.0
22	15 34 31.7	24 31 44.2	" 4 14.3	June 21	6 27 45.4	187 1 53.6	" 4 5.0
Sept. 16	12 8 35.1	355 35 15.0	" 4 16.4	27	11 53 15.0	274 54 27.8	" 4 20.0
Dec. 12	10 28 58.7	56 38 30.8	" 4 12.7	27	11 55 41.2	274 56 8.1	" 4 15.2
1827.				July 3	17 30 32.5	5 7 18.5	" 3 40.9
Feb. 16	15 41 53.5	204 44 54.0	" 4 3.0	19	5 4 10.5	194 49 15.7	" 4 14.5
Mar. 17	15 32 27.5	229 30 30.5	" 4 18.8	21	6 40 30.5	220 59 9.3	" 4 12.1
18	16 30 59.1	245 5 8.4		22	7 33 34.9	235 17 46.7	" 4 18.3
May 6	7 46 32.6	159 29 38.8		23	8 30 13.6	250 29 53.2	" 4 21.35
7	8 34 26.1	172 27 35.8		24	9 29 52.3	266 26 49.7	" 4 20.1
8	10 17 21.9	200 12 36.5	" 4 4.6	Aug. 20	7 18 7.1	259 16 24.9	
June 13	15 55 17.7	319 41 44.5	" 3 51.7	21	8 17 0.2	274 57 43.0	" 4 21.77
July 3	6 38 51.8	201 29 40.5	" 4 25.2				
4	7 31 53.1	215 49 40.2	" 4 20.0				

The Stars upon which the Moon's right ascensions repose may be referred to, page 24, 25, and 26.

From the known right ascensions of the Moon's culminating Stars, observed on the given day, I deduce the true right ascension of the Moon's centre for the apparent time of the Moon's limbs passing the middle wire. For the corresponding time at Greenwich (found here upon the supposition of the longitude $=10^h\ 4^m\ 3^s$), I find also from the Nautical Almanac, the Moon's right ascension, applying thereto the correction found from the Observations made on that day at Greenwich. The difference between the two right ascensions, divided by the Moon's horary motion, which need only to be known superficially, is the error of the assumed Longitude, which in East Longitude is additive or subtractive, accordingly as the Nautical Almanac gives the Moon's $\mathcal{R}$ greater or less than the Observation.

The above Longitudes rest merely upon a comparison with the Nautical Almanac. When the errors thereof are once known, it will be sufficient to apply double their quantities to the Longitudes in time found on the corresponding days.

The Longitude of the Observatory by a mean of all hitherto calculated Observations, including the occultations, is $10^h\ 4^m\ 6^s.25$.

Port Jackson.

The geographical position of Port Jackson being of nautical importance, I think its determination here is not misplaced.

The observations of Sir Thomas Brisbane with two reflecting circles of Troughton and one of Jecker, give the latitude of Government House at Sydney 33° 51′ 58″ S.

Sir Thomas Brisbane observed the eclipse of the sun 16th August 1822, at the same place, as follows:

	h	m	s	
Beginning . . .	19	36	49.0	} Mean time at Sidney.
End	22	10	3.5	}

Hence I find by a comparison with the Nautical Almanac the

	h	m	s
longitude of Sydney	10	5	17.89

The solar eclipse of 9th December 1806, observed by Admiral Bligh, gives, according to my calculation, ...

Another, observed by Captain Philip Parker King, R.N. . . . .

By chronometers frequently carried backward and forward between Pa-

ramatta and Sydney, the difference of longitude between both places was found 51″.93.

My calculation of the above solar eclipse observed by Sir THOMAS BRISBANE in Sydney, and myself at Paramatta, gives

		From Beginning. h m s	End. h m s
The conjunction at	Sydney	21 26 51.8	21 26 34.38
	Paramatta	21 25 55.32	21 25 42.40
Hence Diff. of Long.		56.48	51.98

But I believe we must reject the results from the beginning, and hold ourselves to that from the end 51ˢ.98.

Professor WURM has computed my observations at Paramatta of the transit of Mercury over the sun's disk 5th November 1822, as follows:

	Inner Contact. h m s	Conjunction. h m s ″
Immersion	23 7 19.78	0 5 35.48 + 27.087 x.
Emersion	1 49 8.43	0 8 13.66 − 13.297 x.
	Outer Contact.	
Immersion	23 4 39.20	0 6 32.82 + 25.944 x.
Emersion	1 52 6.92	0 8 10.02 − 12.953 x.

Professor WURM has also calculated the observations made of this phænomenon by Sir THOMAS BRISBANE at Sydney, and has had the goodness to communicate his calculation to me, viz.

		Inner Contact. h m s	Conjunction. h m s ″
Sydney mean time	Immersion	23 8 6.28	0 6 52.20 + 27.068 x.
	Emersion	1 50 1.83	0 9 3.42 − 13.286 x.
		Outer Contact.	
	Immersion	23 5 23.22	0 7 22.08 + 25.923 x.
	Emersion	1 53 0.34	0 9 0.68 − 12.943 x.

Professor WURM adds:

"Thence follow immediately the differences of longitude between Sydney and Paramatta:

	Per Immersion. s s	Per Emersion. s s
By inner contact	+ 49.30 − 0.024 x.	+ 49.76 + 0.011 x.
By outer contact	+ 49.26 − 0.021 x.	+ 50.66 + 0.010 x.

"The mean of all four phases gives + 49ˢ.75, or that of the inner contact only (as the observation most to be depended on) + 49ˢ.53, which result cannot be materially altered by the small coefficient of x. I found, however, x = + 3ˢ.917.

"49ˢ.6 may therefore be adopted for difference of longitude between Sydney and Paramatta with the more confidence, as inner and outer contact give almost the same result, which is at the same time a proof of the exactness of the observations made at Sydney as well as Paramatta."

I should prefer, however, to take a mean of 51″.93, 51″.98 and 49″.6 = 50″.88, which being added to 10ʰ 4ᵐ 6ˢ.25, the longitude of the observatory at Paramatta, give for longitude of Sydney 10ʰ 4ᵐ 57ˢ.13.

Remark.—The conjunction 0ʰ 6ᵐ 52ˢ.2 deduced from the inner contact of the immersion of Sydney, is probably written wrong by Professor WURM. I suspect he meant it 0ʰ 6ᵐ 24ˢ.78. I have, however, not ventured to alter it.

II. *Solar Observations.*

1.) Solstices.

a.) Observed with REICHENBACH's repeating Circle.

I shall first state the methods employed in the Reductions of the Observations, and begin with,

The Reduction to the Meridian.

Already, on occasion of the first southern solstice observed in this colony, I remarked the insufficiency of DELAMBRE's method for the reduction to the meridian when the sun culminates near the zenith, on account of the slow convergency of the series employed by him, under such circumstances: when the hour angle is about 25′, the second term of his formula will in a set of four observations amount to 100″, the third to 60″, and even the fourth to 12″; and the work of DELAMBRE's third and fourth term is very laborious.

I have therefore substituted another series, the very first term of which comes as near the truth as the four terms of that of DELAMBRE.

I find the middle of the times of observation for which I take out DELAMBRE's first and second part Δ and δ. I take also out these parts $\Delta' \Delta'' \Delta''' \ldots$ and $\delta' \delta'' \delta'''$ for each individual time $t' t'' t'''$ and call their means $\ldots \frac{\Delta' + \Delta'' + \Delta''' + + \ldots}{n} = S$ and $\frac{\delta' + \delta'' + \delta''' + + \ldots}{n} = S$, n being the number of observations, M the meridional zenith distance, z the observed zenith distance or mean arc, and r = cos lat. × cos declin., $\sigma = \frac{r}{\sin\left(\frac{M+Z}{2}\right)}$, $p = \frac{r}{\sin z}$.

Then is the reduction to the meridian $R = \Pi S - p^2 \text{ cotang. } z\ (s - \delta)$.

Demonstration.—Be ζ the zenith distance corresponding to the middle time T; $z'\ z''\ z'''$ .... the different unknown zenith distances envelopped in the arc run through, and z their mean, which is known. Call $\zeta - z' = a$, $\zeta - z'' = b$ &c. &c.... Then is

$$\cos M - \cos\zeta = 2r\sin^2\tfrac{1}{2}\tau = r\,\Delta\,\sin 1''$$

$$\text{subtract} \quad \frac{\cos M - \cos z' = 2r\sin^2\tfrac{1}{2}t = r\,\Delta'\sin 1''}{\cos\zeta - \cos z' = r(\Delta' - \Delta)\sin 1''}$$

$$2\sin\tfrac{1}{2}(z' - \zeta) = \frac{r(\Delta' - \Delta)\sin 1''}{\sin\left(\frac{z+\zeta}{2}\right)} \qquad a = \frac{r(\Delta' - \Delta)}{\sin(\zeta + \frac{1}{2}a)} \qquad b = \frac{r(\Delta'' - \Delta)}{\sin(\zeta + \frac{1}{2}b)} \text{ &c. &c.}$$

$$\frac{2p(\Delta' - \Delta)}{\cot\zeta\sin 1''} = \frac{2a}{\cot\zeta\sin 1''} + a^2;\ \sqrt{\frac{2p(\Delta' - \Delta)}{\cot\zeta\sin 1''} + \frac{1}{\cot^2\zeta\sin^2 1''}} = a + \frac{1}{\cot\zeta\sin 1''}$$

If we now call $2\,p\cot\zeta\sin 1'' = q$, we obtain

$$a = \frac{\tan\zeta}{\sin 1''}\sqrt{1 + q(\Delta' - \Delta)} - \frac{\tan\zeta}{\sin 1''}$$

$$\text{or } a = \frac{\tan\zeta}{\sin 1''}\left\{\left[1 + q\,(\Delta' - \Delta)\right]^{\frac{1}{2}} - 1\right\}$$

which resolved according to the binomial theorem gives

$$a = \frac{\tan z}{\sin 1''}\left\{q\,\frac{(\Delta' - \Delta)}{2} - q^2\frac{(\Delta' - \Delta)^2}{2.4} + \frac{3q^3(\Delta' - \Delta)^3}{2.4.6} - \frac{3.5\,q^4(\Delta' - \Delta)^4}{2.4.6.8} + - +\right\}$$

Placing now for q its value in the two first parts, and considering that $\frac{\Delta^2\sin 1''}{2} = \delta$ according to the construction of DELAMBRE's Tables,

$$a = p(\Delta' - \Delta) - p^2\cot\zeta\,(\delta' + \delta - \Delta'\Delta\sin 1'') + \frac{\tan\zeta\,3q^3(\Delta' - \Delta)^3}{\sin 1''.2.4.6} - \frac{\tan\zeta\,3.5.q^4(\Delta' - \Delta)^4}{\sin 1''.2.4.6.8}$$

And in the same manner

$$b = p(\Delta'' - \Delta) - p^2\cot\zeta\,(\delta'' + \delta - \Delta''\Delta\sin 1'') + \frac{\tan\zeta\,3q^3(\Delta'' - \Delta)^3}{\sin 1''.2.4.6} - \frac{\tan\zeta.3.5.q^4(\Delta'' - \Delta)^4}{\sin 1''.2.4.6.8}$$

and $c = p(\Delta''' - \Delta) - p^2\cot.\zeta\,(\delta''' + \delta - \Delta'''\Delta\sin 1'') + \ldots\ldots\ldots$ &c. &c. &c....

$$\frac{a+b+c++}{n} = C = p(S - \Delta) - p^2\cot z\left\{s - \delta - \Delta(s - \Delta)\sin 1''\right\} + \frac{3q^3\tan\zeta}{n\sin 1''}\left\{\frac{(\Delta' - \Delta)^3 + (\Delta'' - \Delta)^3 + (\Delta''' - \Delta)^3 +}{2.4.6.}\right\} - \text{&c.}...$$

adding up and taking a mean.

C is therefore the quantity to be added to the mean z of the zenith distances, in order to have the zenith distance ζ corresponding to the mean of the times. If the change of altitude were proportional to the change of time, C would be

$= 0$, and the reduction to the meridian $R = \pi\,\Delta$; but now

$$R = \pi\,\Delta + C$$

C is too great for a correction whereof the greater part should always be collected in the first term.

$\Delta = S - S + \Delta = S - (S - \Delta)$; therefore $\pi\,\Delta = \pi\,S - \pi\,(S - \Delta)$; and

$$R = \pi\,S - \pi\,(S - \Delta) + p\,(S - \Delta) + \cot\zeta\,p^2\,\Delta\,(S - \Delta)\sin 1'' - \cot\zeta\,p^2\,(S - \delta)$$

$$= \pi\,S - p^2\cot\zeta\,(S - \delta) - \left\{\frac{\pi^3\,S\cos\left(z + \frac{z + M}{2} - p^3\,\Delta\cos z\right)}{\sin z}\right\}(S - \Delta)\sin 1''$$

omitting cubes and higher powers.

The last term is almost always insensible, and may be neglected; and in the room of ζ, which is unknown, z or the observed zenith distance may be used in the calculation, which together with my having assumed $\frac{2\sin\frac{1}{2}(z - \zeta)}{\sin 1''} = z - \zeta = a$ never causes the error to amount to one second of arc in the reduction as long as this is not above two degrees.

Correction of the Hour-angle for change of Equation of Time.

Biot in his *Astronomie*, vol. i. p. 451, finds it necessary to correct the hour-angle for daily rate of clock, but neglects at the same time a greater source of error. In solar observations the observed hour-angle is apparent solar time, whilst the interval per clock corrected for sidereal acceleration is mean time, and should be diminished in both solstices by a proportional part of the daily retardation of apparent solar time upon mean time, given in the Nautical Almanac in the column of daily difference of equation of time. This is a gaining rate of the clock of $13''$ in the northern, but of $30''$ in the southern solstice, and more therefore than any clock ought to have. These considerations are unimportant in the northern parts of Europe; but nobody will dispute their importance where the zenith distance is 10°, when an error of $1''$ in the hour-angle of 24 minutes causes an error of $10''$ in latitude; I have therefore annexed a Table showing the correction to be subtracted from the hour-angle during the southern solstice.

Argum. Hour-angle....	3′	6′	9′	12′	15′	18′	21′	24′	27′	30′
Correction subtracted ..	0.06	0.12	0.19	0.25	0.31	0.37	0.44	0.50	0.56	0.62

In the same manner, if from absolute altitudes of the sun we would infer the sidereal time of the sun's culmination, the hour-angle converted to sidereal time must be decreased or increased by a proportional part of the daily difference of equation of time, according as the apparent time is gaining or losing upon mean time, or, which is the same, according as the daily difference of right ascension is less or more than $3^{s}\ 56''.6$.

Correction of the assumed Time of the Sun's Culmination.

It is clear that the utmost precision in the time is required under such circumstances, when the vicinity to noon is indeed the most favourable period of the day for determining this very element—the time, which in finding the latitude we assume as given. But I believe that both objects can be attained at once, and that circummeridional altitudes near the zenith afford the means of ascertaining the error in the level of the transit as well as the latitude.

If we find that with an assumed time of the sun's culmination from several sets of circummeridional altitudes, the deduced respective meridional altitudes A, B, C, D, E either gradually decrease or increase, we may suspect that the sun's transit has been assumed too late or too soon. I suppose the correction for the change of declination during the hour-angle (which also occasions a gradual alteration) to be already applied. With the mean of Delambre's numbers Δ in an ascending set, take out of his Tables for the Reduction to the Meridian the quantity corresponding to a change of one second in time, which call m, take also with the mean of Δ in a descending set a similar quantity n. Then is

$\frac{A-E}{\pi m+\pi^{iv} n} = \frac{B-D}{\pi^{i} m' + \pi^{iii} n'} =$ &c. &c. $= x$ the error by which the sun's culmination has been assumed too late; and $A - \pi m x = E + \pi^{iv} n^{ii} x = B - \pi' m' x = D + \pi^{iii} n' x =$ the true meridional altitude.

Reduction to the Solstice.

The reduction to the solstice is computed after the following formula;

$\varrho = \frac{c \times \sin^{2} \frac{1}{2} L}{\cos \frac{1}{2} (D + \omega)}$ where the constant $c = \frac{2 \sin \omega}{\sin 1''}$, L = complement of sun's longitude; D the declination; and ω the obliquity of the ecliptic.

Methods of Observing the Repetitions.

During the last years when I was without an assistant, the intervals, and therewith the second parts of the reductions $p^2 \cot z\ (s - \delta)$ would have become too great in the southern solstice, if I had attended at the same time to the level, which moreover became useless under the sun's vertical rays. This is therefore an additional reason why I have resorted to reflection from mercury. The small nadir distance enabling me to place it upon the same isolated pillar with the instrument, and to keep all the openings of the dome shut except the top slide, the mercury was secured against wind, and all percussion save that occasioned by handling the instrument, and no glass cover was required. During the same series I did not revolve 180° in azimuth, but pointed the tube in a left-sided series, first by means of the great circle to the reflected image, and next by shifting the small circle to the direct object, and I then again turned the great circle for the observation by reflection, repeating this process until a series was completed, containing a multiple of altitudes instead of zenith distances. In a right-sided series it is the great circle by which the tube must be first pointed to the direct object. The repetitions can thus be carried on with remarkable expedition by one observer. All that is required is that the instrument remains steady during the interval between a reflected and direct vision. The reflection and direct vision enabled me by three observations to verify that the optical axis described a vertical circle, and the effects of bending compensated themselves. I shall illustrate the process by an

Example.

December 22, 1827: Barom. 29.726. Therm. 83°. Transit per Clock $17^h\ 58^m\ 1^s.9$.

Sets.	Readings.	Times per sidereal Clock.							
0.	° ′ ″ 32 15 25								
I.	346 59 2	h m s ...17 35 52.5	m s 36 36	m s 37 34	m s 38 10				
II.	59 26 8.5...	41 4	41 48.3	42 52.7	43 28.3	m s 44 24.5	m s 45 9	m s 46 8.8	m s 46 44	m s 47 43	m s 48 51.0
III.	134 44 26.5...	52 13	53 2.0	53 47.0	54 34.0	4 1.0	4 40	5 59.0	6 54	7 58	8 53.3
IV.	204 31 31	...18 12 2	12 42.0	13 43.0	14 13.0	14 57.4	15 34	16 29.0	17 45	17 47	18 28.0

I. Set.			II. Set.			III. Set.			IV. Set.		
Hour Angle.	Δ.	ϑ.	Hour Angle.	Δ.	ϑ.	Hour Angle.	Δ.	ϑ.	Hour Angle.	Δ.	ϑ.
′ ″	″	″	′ ″	″	″	′ ″	″	″	′ ″	″	″
22 5.1	956.7	2.22	16 54.8	561.4	0.765	5 47.8	65.9	0.01	13 57.5	382.4	0.357
21 22.0	895.8	1.94	16 10.6	513.6	0.642	4 59.0	48.4	0.01	14 37.4	419.9	0.427
20 24.2	816.9	1.62	15 6.4	447.9	0.485	4 14.1	35.2	0.005	15 38.2	479.9	0.556
19 48.3	769.6	1.43	14 30.9	413.6	0.413	3 27.3	23.5	0.00	16 8.1	511.0	0.635
			13 35.0	362.1	0.320	5 58.0	69.9	0.01	16 52.4	558.7	0.756
20 54.9	859.74	1.802	12 50.6	323.9	0.252	6 37.0	86.0	0.02	17 28.9	599.7	0.878
		1.793	11 51.0	275.6	0.181	7 55.7	123.6	0.04	18 23.8	664.2	1.069
			11 15.8	249.1	0.150	8 50.5	153.5	0.06	18 59.1	707.2	1.22
	(s − δ) =	0.009	10 17.0	207.6	0.107	9 54.3	192.6	0.09	19 41.5	760.9	1.40
			9 9.2	164.5	0.070	10 49.3	230.0	0.13	20 22.3	814.3	1.612
			13 10.13	351.93	0.3385	6 51.31	102.9	0.0375	17 12.92	589.82	0.891
					0.2820			0.02			0.8188
				(s − δ) =	0.0565		(s − δ) =	0.0175		(s − δ) =	0.0722

The Hour-angles are reduced to apparent Solar time.

	I. Set.	II. Set.	III. Set.	IV. Set.
	° ′ ″	° ′ ″	° ′ ″	° ′ ″
Mean Arc.	78 40 54.25	79 14 42.65	79 31 49.8	78 58 42.45
Refract. — Parallax	−9.01	−8.43	−8.13	−8.71
	78 40 45.24	79 14 34.22	79 31 41.67	78 58 33.74
Reduct. to the Merid. { part 1 ..	+58 5.0	+24 24.24	+7 13.89	−40 23.74
Reduct. to the Merid. { part 2 ..	−0.772	−5.25	−1.69	−6.463
True Meridian Zenith Dist.	79 38 49.47	79 38 53.21	79 38 53.87	79 38 51.02
Mean of all	79 38 51.89, true Merid. Zen. Dist. of Sun's centre.			

I regret that I had always to interrupt the Observations at noon, in order to observe the Sun with the Transit and Mural Circle.

The second part of the Reduction to the Meridian depends not only upon the Distance from the Meridian, but also upon the number of the Observations contained in the Set, and the intervals between them. Only small corrections that are of variable signs, and complete their periods during the time that embraces the observations may be neglected in calculations; but where the sign is constant, even the smallest should be attended to, as the error will not be diminished by taking a mean of the whole, and no benefit arises from often repeated observations.

The original observations of the Abstracts, which follow, of the Solstices observed at Paramatta, would occupy too much space in printing, and are therefore preserved in Manuscript.

Southern Solstice, December 1821.

1821.	True Meridian Zenith Dist. of Sun's Centre.	Corr. for Sun's Latitude.	Reduction to Solstice.	Zenith Distance of Tropic of Capricorn.
Dec. 15	10° 32′ 29.65″	− 0.04″	− 11′ 38.09″	10° 20′ 51.52″
17	„ 26 53.26	+ 0.44	5 57.71	„ „ 56.00
20	„ 21 57.39	0.59	0 58.31	„ „ 59.67
21	„ 21 7.72	0.65	0 14.96	„ „ 58.41
22	„ 20 50.70	0.67	0 0.02	„ „ 51.35
23	„ 21 7.36	0.68	0 13.36	„ „ 54.68
24	„ 21 55.14	0.63	0 55.12	„ „ 60.65
25	„ 22 59.61	0.57	2 5.28	„ „ 54.90
26	„ 24 39.42	0.46	3 43.42	„ „ 56.46
27	„ 26 42.01	0.35	5 50.28	„ „ 52.08
28	„ 29 20.28	0.21	8 24.89	„ „ 55.60
29	„ 32 15.12	+ 0.08	−11 28.43	„ „ 46.77
				10° 20′ 54.42″
Luni-solar nutation				+ 7.80
Reduct. to Jan. 1, 1822				+ 0.01
M. Z. D. Tropic of Capricorn, Jan. 1, 1822				10° 21′ 2.23″

Northern Solstice, June 1822.

1822.	True Meridian Zenith Dist. of Sun's Centre.	Corr. for Sun's Latitude.	Reduction to Solstice.	Zenith Dist. of Tropic of Cancer.
June 9	56° 41′ 49.63″	+ 0.408″	+ 34′ 40.67″	57° 16′ 30.07″
10	„ 46 59.97	+ 0.26	29 33.96	„ „ 34.19
11	„ 51 33.99	+ 0.12	24 51.11	„ „ 25.22
12	„ 56 6.79	− 0.03	20 32.59	„ „ 39.35
13	„ 59 52.98	− 0.19	16 38.49	„ „ 31.28
14	57 3 29.98	− 0.29	13 7.82	„ „ 37.51
15	„ 6 30.19	− 0.31	10 3.52	„ „ 33.40
16	„ 9 11.80	− 0.41	7 22.98	„ „ 34.37
18	„ 13 19.11	− 0.39	3 16.16	„ „ 34.88
19	„ 14 42.88	− 0.32	1 49.86	„ „ 32.42
20	„ 15 44.90	− 0.22	0 48.41	„ „ 33.31
21	„ 16 18.51	− 0.12	0 11.77	„ „ 30.16
23	„ 16 14.57	+ 0.17	0 13.07	„ „ 27.81
28	„ 9 2.60	+ 0.81	7 29.89	„ „ 33.30
29	„ 6 20.16	+ 0.85	10 11.38	„ „ 32.39
30	„ 3 12.41	+ 0.88	13 17.27	„ „ 30.56
July 1	56 59 45.81	+ 0.88	+ 16 47.43	„ „ 34.12
			Mean	57° 16′ 32.64″
Luni-solar nutation				− 6.77
Reduct. to Jan. 1, 1822				+ 0.22
M. Z. D. Tropic of Cancer, Jan. 1, 1822				57° 16′ 26.09″
Zenith distance of Tropic of Capricorn				10° 21′ 2.237″
Half difference = obliquity of eclipse				23° 27′ 41.93″
Half sum latitude of the observatory				33° 48′ 44.1″

Southern Solstice, December 1822.

Dec. 14	10° 36′ 54.25″	+ 0.22″	− 16′ 4.8″	10° 20′ 49.67″
15	„ 33 19.50	+ 0.10	+ 12 26.09	„ „ 53.51
17	„ 27 23.51	− 0.18	6 32.31	„ „ 51.02
18	„ 25 3.12	0.33	4 17.63	„ „ 45.16
19	„ 23 32.54	0.49	2 31.07	„ „ 60.98
20	„ 22 7.98	0.61	1 12.75	„ „ 54.62
21	„ 21 14.92	0.74	0 22.72	„ „ 51.46
22	„ 20 54.46	0.85	0 1.01	„ „ 52.60
23	„ 21 4.46	0.93	0 7.63	„ „ 55.90
24	„ 21 33.61	0.94	0 42.56	„ „ 50.11
25	„ 22 35.51	0.94	1 45.78	„ „ 48.79
27	„ 26 12.28	0.82	5 17.02	„ „ 54.44
28	„ 28 40.41	− 0.68	+ 7 44.98	„ „ 54.75
			Mean	10° 20′ 52.54″
Luni-solar nutation				+ 5.67
Reduct. to Jan. 1, 1823				+ 0.01
M. Z. D. Tropic of Capricorn, Jan. 1, 1823				10° 20′ 58.22″
M. Z. D. Tropic of Cancer, Jan. 1, 1823				57° 16′ 25.70″
Mean obliquity of ecliptic				23° 27′ 43.74″
Latitude of the observatory				33° 48′ 41.96″

Northern Solstice, June 1823.

June 11	56° 50′ 38.70″	+ 0.01″	+ 25′ 56.96″	57° 16′ 35.67″
14	57 2 32.22	0.44	13 56.56	„ „ 29.22
15	„ 5 48.54	0.58	10 45.72	„ „ 34.84
17	„ 10 50.03	0.79	5 37.62	„ „ 28.44
19	„ 14 21.27	0.86	2 8.48	„ „ 30.61
21	„ 16 9.70	0.79	0 18.41	„ „ 28.90
22	„ 16 32.10	0.68	0 0.60	„ „ 33.38
23	„ 16 23.2	0.58	0 6.84	„ „ 30.62
24	„ 15 50.12	0.42	0 39.32	„ „ 29.86
25	„ 14 53.1	0.32	1 35.83	„ „ 29.25
30	„ 4 1.66	0.41	12 28.79	„ „ 30.04
July 1	„ 0 39.6	+ 0.48	+ 15 53.01	„ „ 32.13
			Mean	57° 16′ 31.08″
Luni-solar nutation				− 4.32
Reduction to Jan. 1, 1823				+ 0.25
M. Z. D. Tropic of Cancer, Jan. 1, 1823				57° 16′ 27.01″
M. Z. D. Tropic of Capricorn, Jan. 1, 1823				10° 20′ 58.22″
Half diff. mean obliquity, Jan. 1, 1823				23° 27′ 44.39″
Half sum latitude of the observatory				33° 48′ 42.61″

The three preceding Solstices were observed partly by Sir T. Brisbane, and partly by myself; but the Northern Solstice and Southern Solstice of 1823, which follow, were exclusively observed by Sir T. Brisbane.

1823.	True meridian Zenith dist. of Sun's centre.	Reduction to Solstice.	Corr. for Sun's Lat.	True Zenith Dist. of Tropic of Capricorn.
	° ′ ″	′ ″	″	° ′ ″
Dec. 10	10 57 45.2	−36 37.8	−0.88	10 21 6.56
11	,, 52 0.8	31 3.0	0.90	,, 20 56.90
13	,, 42 16.9	21 14.8	1.0	,, 21 1.1
15	,, 34 14.5	13 16.3	0.9	,, 20 57.3
18	,, 25 41.1	4 47.8	0.5	,, 20 52.77
20	,, 22 34.2	1 29.3	−0.25	,, 21 4.65
22	,, 21 1.4	0 3.6	+0.05	,, 20 57.85
24	,, 21 38.8	0 30.4	+0.26	,, 21 8.66
26	,, 23 51.1	2 52.3	+0.37	,, 20 59.17
27	,, 25 46.3	4 45.2	+0.30	,, 21 1.4
1824. 31	,, 38 2.4	16 58.0	−0.12	,, 21 4.28
Jan. 2	,, 46 57.8	−25 53.7	−0.26	,, 21 3.94

	° ′ ″
Mean	10 21 1.21
Luni-sol. nut., and Red^{n} to Jan. 1, 1823	+2.81
M. Z. D. Tropic of Capricorn, Jan. 1, 1823	10 21 4.02
From former observations, Mean zenith dist. of Trop. of Cancer, Jan. 1, 1823.	57 16 26.52
Half diff. mean obliquity	23 27 41.25
Half sum latitude	33 48 45.26

The following Solstices have been observed by myself.

Northern Solstice, June 1826.

1826.	True Meridian Zenith Dist. of Sun's Centre.	Corr. for Sun's Latitude.	Reduction to Solstice.	True Zenith Dist. of Tropic of Cancer.
	° ′ ″	″	′ ″	° ′ ″
June 12	56 56 2.7	+0.5	+20 24.9	57 16 28.1
14	57 3 18.9	0.4	13 2.4	,, ,, 21.7
15	,, 6 28.9	0.4	9 58.2	,, ,, 27.5
16	,, 9 6.9	0.2	7 18.7	,, ,, 25.8
17	,, 11 23.4	−0.1	5 3.8	,, ,, 27.1
18	,, 13 14.6	0.1	3 13.3	,, ,, 27.8
19	,, 14 41.0	0.2	1 47.9	,, ,, 28.7
20	,, 15 39.3	0.4	0 47.0	,, ,, 25.9
21	,, 16 14.3	0.5	0 11.2	,, ,, 25.0
22	,, 16 26.3	0.6	0 0.0	,, ,, 25.7
23	,, 16 12.8	0.7	0 13.7	,, ,, 25.8
24	,, 15 34.9	0.8	0 52.1	,, ,, 26.2
25	,, 14 30.1	0.8	1 55.2	,, ,, 24.5
26	,, 13 6.4	0.8	3 23.1	,, ,, 28.7
27	,, 11 9.0	0.8	5 15.7	,, ,, 23.9
28	,, 8 51.6	0.7	7 33.0	,, ,, 23.9
29	,, 6 13.8	0.6	10 14.9	,, ,, 28.1
July 1	56 59 26.6	−0.4	+16 51.9	,, ,, 18.1

	° ′ ″
Mean	57 16 26.25
Luni-solar nutation	+4.9
Reduction to Jan. 1, 1827	−0.2
Mean zenith distance of Tropic of Cancer	57 16 30.95
From former observations mean zenith distance of Tropic of Capricorn	10 21 1.6
Half diff. mean obliquity, Jan. 1, 1827	23 27 44.65
Half sum latitude	33 48 46.27

Southern Solstice, December 1826.

1826.	True Meridian Zenith Dist. of Sun's Centre.	Corr. for Sun's Latitude.	Reduction to Solstice.	True Zenith Dist. of Tropic of Capricorn.
	° ′ ″	″	′ ″	° ′ ″
Dec. 16	10 30 16.27	+0.66	− 9 10.27	10 21 6.66
17	,, 27 33.47	0.75	6 28.23	,, 21 5.99
18	,, 25 25.36	0.83	4 14.43	,, 21 11.76
21	,, 21 24.38	0.76	0 21.82	,, 21 3.32
22	,, 20 58.46	0.67	0 0.83	,, 20 58.30
23	,, 21 7.72	0.59	0 8.16	,, 21 0.05
24	,, 21 48.5	0.45	0 43.82	,, 21 5.13
25	,, 22 53.35	0.30	1 47.84	,, 21 5.81
26	,, 24 28.4	0.29	3 20.14	,, 21 7.97
29	,, 31 43.95	+0.25	10 46.51	,, 20 57.69
30	,, 35 14.46	−0.11	14 11.55	,, 21 2.80
31	,, 39 10.50	−0.48	18 4.51	,, 21 5.51

	° ′ ″
Mean	10 21 4.25
Luni-solar nutation and reduction	,, ,, 6.34
Mean zenith distance of Tropic of Capricorn, Jan. 1, 1827	10 20 57.91
From last solstice, mean zenith distance of Tropic of Cancer, Jan. 1, 1827	57 16 29.90
Half difference, mean obliquity	23 27 46.00
Half sum latitude	33 48 43.80

Northern Solstice, June 1827.

1827.	True Meridian Zenith Dist. of Sun's Centre.	Corr. for Sun's Latitude.	Reduction to Solstice.	True Zenith Dist. of Tropic of Cancer.
	° ′ ″	″	″	° ′ ″
June 13	56 58 53.58	−0.65	+17 24.19	57 16 17.52
14	57 2 27.50	0.67	13 50.13	„ „ 16.96
15	„ 5 37.91	0.66	10 40.05	„ „ 17.30
16	„ 8 20.11	0.64	7 54.53	„ „ 14.00
18	„ 12 33.00	0.35	3 37.39	„ „ 10.04
19	„ 14 2.6	0.20	2 5.96	„ „ 8.36
21	„ 15 59.53	−0.08	0 17.46	„ „ 16.91
24	„ 15 32.6	+0.42	0 40.88	„ „ 13.90
25	„ 14 36.52	0.50	1 38.30	„ „ 15.32
26	„ 13 14.1	0.59	3 0.49	„ „ 15.18
27	„ 11 33.06	0.67	4 47.36	„ „ 21.09
28	„ 9 17.1	0.68	6 59.13	„ „ 16.91
29	„ 6 38.56	+0.67	+ 9 35.29	„ „ 14.52

Mean			57 16 15.2
Luni-solar nutation			+ 7.5
Reduction, Jan. 1, 1827			+ 0.26
Mean zenith distance of Tropic of Cancer, Jan. 1, 1827			57 16 22.96
From former observation of Tropic of Capricorn, Jan. 1, 1827			10 20 57.91
Half diff. mean obliquity, Jan. 1, 1827			23 27 42.52
Half sum latitude of the observation			33 48 40.43

Southern Solstice, December 1827. Observed alternately direct and by reflection.

1827.	True Meridian Zenith Dist. of Sun's Centre.	Corr. for Sun's Latitude.	Reduction to Solstice.	True Zenith Distance of Tropic of Capricorn.
	° ′ ″	″	° ′ ″	° ′ ″
Dec. 3	11 49 13.01	+0.4	1 27 57.8	10 21 15.60
6	„ 24 24.66	0.77	1 3 17.25	„ „ 8.18
7	„ 17 13.47	0.8	„ 55 55.8	„ „ 18.47
8	„ 10 13.9	0.82	„ 49 0.65	„ „ 14.12
9	„ 3 39.44	0.81	„ 42 32.15	„ „ 8.10
10	10 57 45.72	0.76	„ 36 30.5	„ „ 15.98
12	„ 47 0.92	0.57	„ 25 47.9	„ „ 13.59
13	„ 42 19.98	0.44	„ 21 8.3	„ „ 12.12
14	„ 38 8.83	0.30	„ 16 55.97	„ „ 13.16
16	„ 31 5.41	+0.0	„ 9 54.24	„ „ 11.17
17	„ 28 16.78	−0.15	„ 7 6.17	„ „ 14.01
18	„ 25 55.54	0.29	„ 4 44.51	„ „ 10.74
19	„ 24 2.97	0.41	„ 2 51.80	„ „ 10.76
20	„ 22 41.49	0.49	„ 1 27.33	„ „ 13.67
21	„ 21 46.36	0.52	„ 0 31.15	„ „ 14.69
22	„ 21 8.11	0.53	„ 0 3.30	„ „ 4.28
23	„ 21 11.99	0.51	„ 0 3.79	„ „ 7.69
24	„ 21 41.09	0.44	„ 0 32.64	„ „ 8.01
25	„ 22 51.85	−0.36	„ 1 29.78	„ „ 21.71
28	„ 28 29.21	+0.05	„ 7 10.84	„ „ 18.32

Luni-solar nutation	10 21 12.718
	− 8.51
Mean zenith distance of Tropic of Capric.	10 21 4.20
Mean zenith distance of Cancer from all preceding observation	57 16 24.8
Half sum latitude of the observatory	33 48 44.5

But by applying to the above zenith distance 10° 21′ 4″.20 the mean obliquity 23° 27′ 43″.1 found with the mural, we obtain 33° 48′ 47″.4 for latitude.

Remarks.—To avoid misconstruction, I remark, that the corrections for sun's latitude, reduction to solstice, luni-solar nutation, and reductions to the commencement of the respective years, have always been applied with the signs adapted for finding the zenith distance of the mean tropic. Thus the correction for the sun's latitude is always applied with the opposite sign, and the luni-solar nutation in the southern solstice with the same sign, but in the northern solstice with the opposite sign, to what the solar tables give.

Northern Solstice, June 1828.

1828.	True Meridian Zenith Dist. of Sun's Centre.	Corr. for Sun's Latitude.	Reduction to Solstice.	True Zenith Distance of Tropic of Cancer.
	° ′ ″	″	′ ″	° ′ ″
June 12	56 57 54.85	+0.17	18 20.30	57 16 15.32
13	57 1 41.76	0.31	14 39.18	„ „ 21.25
14	„ 4 51.50	0.42	11 23.35	„ „ 15.27
15	„ 7 43.59	0.49	8 31.77	„ „ 15.85
16	„ 10 9.9	0.53	6 5.04	„ „ 15.47
17	„ 12 16.0	0.50	4 2.95	„ „ 19.45
18	„ 13 50.08	0.49	2 25.42	„ „ 10.00
19	„ 15 8.69	0.43	1 12.99	„ „ 22.10
20	„ 15 57.40	0.28	0 25.1	„ „ 22.78
21	„ 16 17.50	0.16	0 2.2	„ „ 19.66
22	„ 15 57.30	+0.04	0 4.08	„ „ 1.42
25	„ 13 24.6	−0.38	2 38.3	„ „ 2.52
26	„ 11 47.4	0.53	4 18.92	„ „ 5.79
28	„ 7 25.61	0.75	8 54.74	„ „ 19.6
29	„ 4 13.45	0.81	11 48.96	„ „ 1.61
30	„ 1 6.0	0.83	15 8.33	„ „ 13.50
July 2	56 52 59.4	−0.73	22 59.17	„ 15 57.84
				57 16 13.46
Luni-solar nutation				+ 9.3
Mean zenith distance of Tropic of Cancer				57 16 22.76
Mean obliquity				23 27 43.1
Latitude				33 48 39.66

This solstice was observed partly by reflection.

Southern Solstice, December 1828. Observed alternately direct and by reflection.

1828.	True Mer. Zen. Distance of Sun's Apparent Place.	Corr. for Sun's Latitude.	Reduction to Solstice.	True Zenith Distance of Tropic of Capricorn.
	° ′ ″	″	′ ″	° ′ ″
Dec. 14	10 35 17.34	−0.32	−14 2.37	10 21 14.65
15	„ 31 53.9	−0.19	10 38.92	„ „ 14.80
16	„ 29 1.96	−0.05	7 43.36	„ „ 18.55
17	„ 26 34.9	+0.08	5 15.73	„ „ 19.25
18	„ 24 29.9	0.24	3 16.41	„ „ 13.73
19	„ 22 56.43	0.38	1 45.20	„ „ 11.61
20	„ 21 54.93	0.50	0 42.15	„ „ 13.28
21	„ 21 19.77	+0.59	− 0 7.48	„ „ 12.88
				10 21 14.83
Luni-solar nutation				− 9.8
Mean zenith dist. of Tropic of Capricorn				10 21 5.03
Mean obliquity				23 27 42.78
Latitude				33 48 47.81

This solstice was interrupted on account of my departure.

Solstices observed with the Mural Circle.

The reductions of these solstices have been made as well with the view of deducing the obliquity of the ecliptic from the polar point found by upper and lower culminations of circumpolar stars, as to correct this polar point by an assumed obliquity, for the reduction of the stars observed with the mural circle.

Northern Solstice, June 1822.

1822.	Limb.	Therm.	Barom.	Microscopes. I.	II.	III.	IV.	Refr. Par.	Semidiam.	Reduction to Solstice.	Correction for Lat.	S. P. D. of Tropic not corrected for Polar Point. I.	II.	III.	IV.
			inches.	° ′ ″	′ ″	′ ″	′ ″	″	″	″	″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
June 9	L	54	29.97	113 7 45.0	7 31.5	7 50.5	7 47.7	1 51.23	15 46.65	34 40.67	0.41	113 28 0.21	27 47.11	28 6.11	28 3.31
10	U	56	„ .80	112 40 57.0	40 36.4	41 3.5	41 4.0	„ 19.07	„ „ .55	29 33.96	+0.26	„ 27 36.94	„ 16.34	27 43.44	27 43.94
11	U	58	„ .63	„ 45 56.8	45 35.0	45 53.0	45 56.0	„ 18.47	„ „ .47	34 51.11	−0.19	„ „ 53.0	„ 31.90	„ 49.2	„ 51.8
12	U	59.7	„ .75	„ 50 3.2	49 58.7	50 3.7	50 0.0	„ 20.46	„ „ .38	20 32.59	0.03	„ „ 42.63	„ 38.19	„ 43.13	„ 39.49
13	U	63	„ .80	„ 53 58.0	53 40.0	54 8.0	54 5.0	„ 18.52	„ „ .26	16 38.49	0.19	„ „ 41.12	„ 23.19	„ 51.12	„ 48.19
14	U	59.5	29.95	112 57 26.0	57 7.3	57 32.4	57 34.0	1 19.78	15 46.19	13 7.89	−0.30	113 27 39.51	27 20.81	27 45.91	27 37.51
15	U	59	30.09	113 0 25.0	0 13.7	0 37.0	0 35.5	„ 20.38	„ „ .12	10 3.52	0.31	„ „ 34.69	„ 23.39	„ 46.69	„ 35.19
16	U	54	„ .06	„ 3 4.7	2 56.7	3 21.0	3 8.5	„ 23.06	„ „ .05	7 22.98	0.39	„ „ 36.33	„ 28.53	„ 52.63	„ 40.13
18	L	59	29.90	„ 38 49.0	38 29.0	38 59.3	39 10.5	„ 22.01	„ 45.91	3 16.16	0.39	„ „ 40.87	„ 20.87	„ 51.17	28 2.37
19	U	52	„ .81	„ 8 38.7	8 26.3	8 50.5	8 56.5	„ 21.42	„ „ .85	1 49.86	0.39	„ „ 35.56	„ 23.16	„ 47.26	27 53.26
20	L	51.5	29.92	113 41 21.3	41 12.0	41 37.3	41 31.0	1 23.71	15 45.79	0 48.41	0.22	113 27 47.3	27 37.99	28 3.30	27 57.00
21	U	51.5	„ .90	„ 10 16.0	9 59.3	10 29.1	10 18.0	„ 21.84	„ „ .74	0 11.77	−0.19	„ „ 35.29	„ 18.49	27 48.39	„ 37.29
23	L	56.5	„ .71	„ 42 5.7	41 49.8	42 19.1	42 15.5	„ 21.16	„ „ .65	0 13.07	+0.17	„ „ 54.40	„ 38.50	28 7.8	„ 54.2
29	U	59	„ .99	„ 0 18.8	0 7.8	0 30.8	0 33.7	„ 20.2	„ „ .52	10 11.38	+0.85	„ „ 36.63	„ 25.63	27 48.49	„ 51.22
			Mean of the four Microscopes			113 27 51.115				Mean.....		113 27 42.46	27 28.09	27 47.49	27 48.22
			Luni-solar nutation			−6.77				Polar point		+8.70	+25.30	−1.70	+2.5
			Reduction to January 1, 1823			−0.22				True S. P. D. of Tropic.....		113 27 51.16	27 53.39	27 49.19	27 50.79
			Mean obliquity, January 1, 1823.....			23 27 44.195									

Southern Solstice, December 1822.

1822.	Limb.	Therm.	Barom.	Microscopes. I.	II.	III.	IV.	Refr. Par.	Semidiam.	Reduction to Solstice.	Correction for Lat.	S. P. D. of Tropic not corrected for Polar Point. I.	II.	III.	IV.
			inches.	° ′ ″	′ ″	′ ″	′ ″	″	″	″	″	° ′ ″	° ′ ″	° ′ ″	° ′ ″
Dec. 14	U	86	29.48	104 27 26.0	27 46.5	22 42.3	22 33.0	7.94	16 16.86	16 4.8	+0.2	104 27 46.3	28 6.7	28 2.5	27 53.2
15	L	82.8	„ .59	„ 56 32.8	56 51.0	56 44.3	56 39.6	8.6	„ „ .91	12 26.1	+0.1	„ „ 58.4	„ 16.6	„ 9.9	28 5.2
17	U	76.7	„ .67	„ 17 47.0	18 19.0	18 18.0	17 56.0	8.2	„ 17.31	6 32.3	−0.2	„ „ 39.9	„ 11.9	„ 10.9	27 41.9
19	U	71.3	„ .92	„ 13 47.4	14 21.4	14 2.7	13 56.2	8.3	„ „ .36	2 31.1	0.5	„ „ 41.5	„ 15.5	27 56.8	„ 49.3
20	L	85.5	„ .75	„ 45 11.7	45 45.0	45 17.4	45 24.3	8.3	„ „ .36	1 12.7	0.6	„ „ 49.3	„ 22.6	„ 55.0	28 1.9
21	U	75.2	29.95	104 11 54.4	12 17.2	11 57.1	11 45.9	8.3	16 17.56	0 22.7	−0.7	104 27 56.8	28 19.6	27 59.5	27 48.3
22	L	80.8	30.04	„ 44 2.3	44 30.7	44 21.8	44 13.6	8.5	„ „ .44	0 1.0	0.8	„ „ 51.5	„ 19.9	28 11.0	28 2.8
23	L	85	29.98	„ 44 5.3	44 38.8	44 26.6	44 17.5	8.4	„ „ .54	0 7.6	0.9	„ „ 47.6	„ 21.1	„ 8.9	27 59.8
24	U	91.8	„ .95	„ 12 4.2	12 40.7	12 40.4	12 10.3	7.9	„ „ .6	0 43.6	0.9	„ „ 46.2	„ 22.7	„ 22.4	„ 52.3
25	U	98	30.00	„ 13 11.0	13 39.5	13 24.3	13 11.3	7.8	„ „ .72	1 45.8	0.9	„ „ 49.8	„ 18.3	„ 3.1	„ 50.1
27	L	86.5	„ .89	„ 49 16.1	49 44.3	49 33.2	49 18.3	8.5	„ „ .66	5 17.0	0.8	„ „ 49.1	„ 17.3	„ 6.2	„ 51.3
28	U	91	„ .97	„ 19 1.4	19 38.9	19 20.5	19 14.3	8.0	„ „ .76	7 45.0	−0.7	„ „ 41.5	„ 19.0	„ 0.6	„ 54.4
			Mean of the four Microscopes			66 32 9.71				Mean.....		104 27 48.16	28 17.6	28 5.6	27 54.8
			Luni-solar nutation and reduction			+5.68				Polar point		37 55 37.2	56 9.2	55 57.0	55 43.9
						66 32 15.39				True S. P. D. of Tropic.....		66 32 10.96	32 8.4	32 8.6	32 10.9
			Mean obliquity, January 1, 1823.....			23 27 44.61									

Northern Solstice, June 1826.

1826.	Limb.	Barom.	Therm.	Microscopes. I.	II.	III.	IV.	Refr. Par.	Semidiam.	Reduction to Solstice.	Correction for Lat.	S. P. D. of Tropic not corrected for Polar Point. I.	II.	III.	IV.
		inches.	°	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	″	° ′ ″	′ ″	′ ″	′ ″
June 3	L	29.95	66	113 9 19	9 50.5	9 20.3	9 50	1 16.97	15 47.4	1 13 31.1	−0.53	24 8 19.2	8 20.7	8 20.5	8 29.2
4	U	„ .97	62	112 45 12.4	45 12.6	45 2.5	45 18.8	„ 16.65	„ 47.3	„ 6 2.0	0.4	„ „ 17.9	„ 18.3	„ 8.0	„ 24.4
5	L	30.01	55	113 33 56	33 55	33 48	33 58.5	„ 19.74	„ 47.2	„ 58 56.6	0.2	„ „ 24.9	„ 24.0	„ 17.0	„ 37.5
6	U	29.92	61	112 59 1.7	59 0	58 52.7	59 1.7	„ 17.38	„ 47.1	„ 52 14.2	−0.1	„ „ 20.3	„ 18.6	„ 11.3	„ 30.2
7	L	„ .74	60	113 36 55	36 54	36 43.7	37 1.7	„ 19.1	„ 46.9	„ 45 55.9	+0.1	„ „ 23.2	„ 22.2	„ 11.9	„ 29.8
9	L	29.95	58	113 48 20.5	48 18.5	48 11.2	48 20.8	1 20.65	15 48.8	1 34 31.1	+0.3	24 8 25.7	8 23.8	8 16.4	8 26.1
10	U	„ .98	56	„ 21 55.7	21 49	21 42.3	21 59.2	„ 19.7	„ 48.7	„ 29 24.7	0.4	„ „ 27.2	„ 20.5	„ 13.4	„ 30.7
12	L	30.15	55	114 2 21	2 21	2 12.0	2 27.8	„ 22.5	„ 48.5	„ 20 24.8	0.5	„ „ 22.4	„ 22.4	„ 13.4	„ 29.2
13	L	„ .25	51	„ 6 17	6 23	6 13.0	6 27.0	„ 23.9	„ 48.4	„ 16 31.4	0.5	„ „ 26.4	„ 32.5	„ 22.4	„ 36.5
14	U	„ .24	49	113 38 9	38 8	38 0	38 17	„ 22.5	„ 48.3	„ 13 2.4	0.4	„ „ 20.6	„ 19.6	„ 11.6	„ 28.6
15	L	30.14	55	114 12 49	12 46	12 39.3	12 53.5	1 23.1	15 46.2	1 9 58.2	+0.4	24 8 29.9	8 27.0	8 20.2	8 34.5
16	L	29.91	63	„ 15 35.7	15 28	15 18.5	15 37.6	„ 21.3	„ 46.1	„ 7 18.7	0.3	„ „ 29.8	„ 22.1	„ 12.6	„ 31.7
17	U	„ .80	67.5	113 46 16.2	46 12.8	46 1.5	46 18.6	„ 18.4	„ 46.0	„ 5 3.8	−0.1	„ „ 24.3	„ 21.0	„ 9.6	„ 26.8
18	U	„ .97	56	„ 48 2	48 2	47 53	48 2.7	„ 21.1	„ 46.0	„ 3 13.3	0.2	„ „ 22.1	„ 22.1	„ 13.1	„ 22.8
19	U	30.05	53	„ 49 23	49 20	49 13	49 23.1	„ 21.9	„ 45.9	„ 1 47.9	0.3	„ „ 18.4	„ 15.4	„ 8.4	„ 18.5
20	L	30.03	57	114 22 3	21 59	21 52	22 6.7	1 23.0	15 45.9	1 1 47.0	−0.4	24 8 26.7	8 22.7	8 15.7	8 30.4
21	U	29.87	61.5	113 50 59	50 59	50 48.8	51 3.7	„ 19.9	„ 45.8	„ „ 11.2	0.5	„ „ 15.4	„ 15.5	„ 5.2	„ 30.2
22	L	„ .84	65.5	114 22 51.5	22 51.5	22 40.2	22 57.5	„ 21.0	„ 45.8	„ „ 0.0	0.6	„ „ 26.1	„ 26.1	„ 14.8	„ 32.1
23	U	30.03	57	113 51 0.3	51 0	50 53.5	51 5.3	„ 21.2	„ 45.8	„ „ 13.7	0.7	„ „ 20.3	„ 20.0	„ 13.5	„ 25.3
24	L	29.70	55	114 21 54	21 52.5	21 44.2	22 0	„ 22.4	„ 45.8	„ „ 52.1	0.8	„ „ 21.9	„ 20.4	„ 12.1	„ 27.9
25	U	29.63	55	113 49 20	49 16.1	49 12	49 26	1 20.3	15 45.7	1 1 55.2	−0.8	24 8 20.4	8 16.5	8 12.4	8 26.4
26	U	„ .93	53	„ 47 55	47 45	47 49	47 57.5	„ 21.5	„ 45.7	„ 3 23.1	0.8	„ „ 24.5	„ 14.5	„ 18.5	„ 27.0
27	L	30.19	50	114 17 28.7	17 23	17 12.7	17 33.3	„ 24.5	„ 45.7	„ 5 15.7	0.8	„ „ 22.4	„ 16.7	„ 6.4	„ 27.0
28	U	„ .23	53	113 43 47	43 44	43 32.7	43 47.3	„ 22.1	„ 45.6	„ 7 33.0	0.7	„ „ 27.0	„ 24.0	„ 12.7	„ 27.3
29	U	„ .113	55	„ 41 4.4	41 6	40 52.8	41 6.3	„ 21.3	„ 45.6	„ 10 14.9	0.6	„ „ 25.5	„ 27.1	„ 13.9	„ 27.4
July 1	L	„ .05	58.5	114 6 0.0	5 55	5 49.3	6 5	„ 21.7	„ 45.5	„ 16 51.9	0.4	„ „ 27.7	„ 22.7	„ 17.0	„ 32.7
												24 8 23.47	8 21.4	8 13.15	8 27.7
													+5.00	5.0	5.0	5.0
												S. P. D. of Tropic of Cancer from zero of circle.....	24 8 28.5	8 26.4	8 18.15	8 32.7
												Polar point by circumpolar stars		40 44.7	40 43.5	40 43.6	40 48.0
												Mean obliquity June 15, 1826	23 27 43.8	27 42.9	27 34.55	27 44.7

Mean of four Microscopes..... 23° 27′ 41.5

But assuming the obliquity = 23° 27′ 43.9 as given in the Nautical Almanack,

	I.	II.	III.	IV.
we have for polar points.....	40′ 44.6	40′ 43.5	40′ 34.25	40′ 48.8
the circumpolar stars give.....	40 44.7	40 43.3	40 41.7	40 48.2

Southern Solstice, December 1826.

1826.	Barom.	Ther.	Observed A.P.D.	Limb.	Refract. Parallax.	Reduct. to Solstice.	Semidiameter.	Corr. for Sun's Lat.	True South Polar Dist. of Tropic*.
	inches.	°	° ′ ″		″	° ′ ″	″	″	° ′ ″
Dec. 1	29.75	102	68 32 36.79	L	9.25	1 44 10.2	16 15.5	−0.16	66 32 20.18
3	30.26	73	67 41 41.32	U	9.55	„ 25 47.5	„ 15.8	0.34	„ „ 18.83
4	30.15	75	68 5 44.92	L	9.85	„ 17 13.9	„ 15.9	0.42	„ „ 24.55
5	29.94	81	67 25 2.64	U	9.00	„ 9 6.3	„ 16.0	0.52	„ „ 20.82
6	29.91	90	67 49 55.52	L	9.08	„ 1 25.6	„ 16.2	0.54	„ „ 22.26
7	29.97	89	67 10 5.34	U	8.60	0 54 9.8	„ 16.3	−0.51	„ „ 19.89
10	29.72	83	67 23 30.72	L	8.69	„ 35 4.6	„ 16.6	0.25	„ „ 17.96
11	29.88	81	67 18 2.29	L	8.69	„ 29 36.9	„ 16.7	0.10	„ „ 17.28
12	30.01	75	66 40 28.57	U	8.61	„ 24 36.3	„ 16.8	+0.05	„ „ 17.67
13	30.08	74	67 8 34.09	L	9.03	„ 20 3.3	„ 16.9	0.20	„ „ 23.12
14	30.08	80	66 31 50.85	U	8.39	„ 15 57.8	„ 16.9	+0.35	„ „ 18.69
15	30.214	78	67 0 54.32	L	8.82	„ 12 20.1	„ 17.0	0.51	„ „ 26.55
21	29.94	78	66 48 54.27	L	8.66	„ 0 21.82	„ 17.5	0.76	„ „ 24.37
22	29.99	75	66 15 55.82	U	8.83	„ 0 0.83	„ 17.5	0.67	„ „ 21.98
23	29.99	83	66 16 5.84	U	8.1	„ 0 8.16	„ 17.6	0.59	„ „ 23.93
24	30.05	79	67 49 12.62	L	8.56	„ 0 43.82	„ 17.7	+0.45	„ „ 20.11
25	30.05	75	66 17 42.99	U	8.2	„ 1 47.84	„ 17.7	0.30	„ „ 21.35
26	30.10	72	66 19 15.28	U	8.4	„ 3 20.14	„ 17.7	0.29	„ „ 21.53
29	29.95	72	66 26 40.62	U	8.4	„ 10 46.51	„ 17.7	0.25	„ „ 20.46
30	29.90	74	66 30 4.94	U	8.4	„ 14 11.55	„ 17.8	−0.11	„ „ 19.48
1827.									
Jan. 2	29.77	79.3	67 15 46.27	L	8.89	„ 27 13.3	„ 17.8	−0.55	„ „ 23.51
3	29.63	80	66 48 22.40	U	8.35	„ 32 30.0	„ 17.8	0.56	„ „ 17.99
4	29.41	89	67 26 46.07	L	8.63	„ 38 13.3	„ 17.8	0.51	„ „ 23.09
5	29.45	81	67 0 19.42	U	8.44	„ 44 23.9	„ 17.7	0.40	„ „ 21.26
6	29.50	81	67 39 37.1	L	9.02	„ 51 1.6	„ 17.7	0.29	„ „ 26.53
7	29.75	76	67 46 40.05	L	9.38	„ 58 6.0	„ 17.7	−0.14	„ „ 25.59
8	29.704	83	67 54 15.57	L	9.31	„ 35 36.9	„ 17.7	0.0	„ „ 30.28
9	29.83	83	68 2 15.69	L	9.52	1 13 34.2	„ 17.6	+0.15	„ „ 33.56
10	29.74	88	67 37 56.13	U	9.03	1 21 57.8	„ 17.6	0.30	„ „ 25.26
11	29.84	83.5	68 19 17.04	L	9.75	1 30 47.5	„ 17.5	+0.44	„ „ 22.23

Mean			66 32 22.344
Luni-solar nutation			−6.32
			66 32 16.02
Mean obliquity, Jan. 1, 1827.			23 27 43.98

* In the above Solstice the Polar Point has been already applied to the South Polar Distances.

Northern Solstice, June 1827.

1827.	Limb.	Barom.	Inside Ther.	Outside Ther.	Observed Mean of the four Microscopes.	Bessel's Refract.	Paral.	Semidiameter.	Reduction to Solstice.	Cor. for Sun's Lat.	Apt. Obliquity not corr. for Polar Point.
		inches.	°		° ′ ″	″	″	″	″	″	° ′ ″
June 1	L	30.313	68	60	112 25 32.7	1 24.98	7.04	−15 47.6	1 31 36	+0.68	23 42 36.72
2	L	30.246	56.5	62	„ 33 55.95	„ 24.99	7.04	„ 47.5	„ 23 15.3	0.65	„ „ 42.25
3	L	30.134	56	66.5	„ 41 43.82	„ 24.11	7.15	„ 47.4	„ 15 17.85	0.60	„ „ 31.83
5	U	30.076	.....	69.5	„ 24 58.62	„ 22.70	7.12	„ 47.1	„ 0 33.0	0.39	„ „ 34.69
8	U	30.152	59	61.5	„ 44 5.85	„ 25.32	7.15	„ 46.9	0 41 22.35	−0.08	„ „ 33.19
13	U	30.105	.....	57.5	113 8 12.25	„ 27.01	7.19	„ 46.3	„ 17 24.65	0.65	„ „ 42.37
14	L	29.797	.....	55	„ 43 17.55	„ 28.79	7.23	„ 46.24	„ 13 50.02	0.67	„ „ 42.22
15	L	29.828	55	65	„ 46 26.72	„ 27.03	7.23	„ 46.13	„ 10 39.9	0.68	„ „ 39.61
16	U	30.034	.....	58.5	„ 17 35.2	„ 27.30	7.20	„ 46.02	„ 7 54.39	0.64	„ „ 36.07
18	L	30.232	.....	58	„ 53 28.12	„ 30.08	7.25	„ 45.96	„ 3 37.34	0.53	„ „ 41.77
19	U	30.205	.....	58	„ 23 22.2	„ 28.27	7.21	„ 45.9	„ 2 5.905	−0.32	„ „ 34.74
21	L	29.96	.....	63	„ 56 40.15	„ 28.43	7.25	„ 45.8	„ 0 17.66	0.04	„ „ 33.15
24	U	29.864	.....	60.8	„ 24 50.25	„ 26.79	7.21	„ 45.65	„ 0 40.905	+0.43	„ „ 36.815
25	U	30.206	.....	59	„ 23 54.6	„ 27.93	7.21	„ 45.6	„ 1 38.36	0.51	„ „ 39.79
26	L	30.029	.....	60	„ 53 56.52	„ 29.30	7.25	„ 45.58	„ 3 0.57	0.59	„ „ 34.15
27	L	30.04	.....	60.5	„ 52 14.02	„ 29.25	7.25	„ 45.57	„ 4 47.52	0.67	„ „ 38.64
28	L	30.00	54	54	„ 50 5.42	„ 29.90	7.25	„ 45.55	„ 6 59.12	0.69	„ „ 42.33
29	U	29.973	.....	52	„ 15 54.38	„ 28.3	7.20	„ 45.53	„ 9 35.37	0.67	„ „ 37.05
July 2	U	29.52	.....	59	„ 5 48.0	„ 28.95	7.17	„ 45.5	„ 19 50.9	0.42	„ „ 46.60
4	U	30.34	54	58	112 56 49.72	„ 27.15	7.18	„ 45.6	„ 28 42.5	+0.13	„ „ 37.92
11	U	30.074	55	56	„ 44 58.95	„ 26.21	7.17	− „ 45.7	1 12 12.8	−0.70	„ „ 44.39

Apparent obliquity	23° 27′ 36″.18	Mean	23 42 38.54
Luni-solar nutation	+7 .5	Polar point per circumpolar stars	−15 2.36
Reduction to Jan. 1, 1828	−0 .26		
Mean obliquity, Jan. 1, 1828	23 27 43 .42		

Southern Solstice, December 1827.

1827.	Limb.	Barom.	Therm.	Semidiam.	Refr. Par.	Reduction to Solstice.	Corr. for Sun's Lat.	S. P. D. of Tropic not corrected for Polar Point. I.	II.	III.	IV.	Mean of four Microscopes.
		inches.	°	″	″	′ ″	″	° ′ ″	′ ″	′ ″	′ ″	′ ″
Dec. 3	L	29.948	76	16 15.6	9.92	1 27 57.8	+0.4	66 47 6.42	47 9.22	47 11.22	47 10.92	47 9.445
5	U	29.927	77	„ 15.87	9.64	„ 11 5.06	0.68	„ 46 59.13	47 7.43	„ 4.13	„ 6.38	„ 4.277
6	U	30.028	74	„ 16.0	9.17	„ 3 17.25	0.77	„ 47 3.17	„ 8.17	„ 5.17	„ 13.67	„ 7.545
7	U	29.99	83	„ 16.13	8.8	0 55 55.8	0.80	„ 46 54.9	46 57.94	46 59.9	„ 4.4	46 59.285
8	U	29.928	90	„ 16.27	8.51	„ 49 0.65	0.82	„ 46 57.22	47 7.72	47 2.32	„ 7.12	47 3.595
9	U	29.742	100	„ 16.36	8.11	„ 42 32.15	0.81	„ 47 5.91	„ 14.41	„ 6.91	„ 17.41	„ 11.16
10	L	29.70	84.3	„ 16.49	8.83	„ 36 30.5	0.76	„ 47 6.56	„ 13.26	„ 4.66	„ 13.6	„ 9.52
12	L	29.606	90.5	„ 16.73	8.54	„ 25 47.9	0.57	„ 46 57.57	„ 7.97	„ 6.57	„ 11.47	„ 5.895
13	U	29.577	99.5	„ 16.84	7.66	„ 21 8.3	0.44	„ 46 58.94	„ 7.66	46 57.84	„ 6.64	„ 2.77
14	L	29.784	80.5	„ 17.02	8.68	„ 16 55.97	+0.30	„ 46 54.5	„ 9.0	47 11.6	„ 17.7	„ 8.2
16	U	30.223	91.3	„ 17.11	8.03	„ 9 54.24	0.00	„ 46 56.81	„ 9.7	46 59.6	„ 6.7	„ 3.2
17	L	30.19	86	„ 17.19	8.63	„ 7 6.17	−0.15	„ 47 5.12	„ 8.82	47 3.52	„ 12.12	„ 7.39
18	L	29.97	96	„ 17.28	8.18	„ 4 44.51	0.29	„ 46 59.3	„ 10.3	„ 9.1	„ 15.1	„ 8.45
19	L	29.772	103.7	„ 17.36	7.91	„ 2 51.8	0.41	„ 47 1.4	„ 9.9	„ 12.4	„ 14.0	„ 9.42
20	U	29.65	82.5	„ 17.44	7.86	„ 1 27.33	0.49	„ 46 57.3	„ 8.5	„ 6.6	„ 7.3	„ 4.925
21	L	29.853	73	„ 17.50	8.66	„ 0 31.15	0.52	„ 46 59.08	„ 10.18	„ 9.78	„ 9.18	„ 7.055
22	U	29.726	83	„ 17.52	7.82	„ 0 3.30	0.53	„ 46 52.87	„ 7.17	„ 1.47	„ 6.17	„ 1.92
23	L	29.892	84	„ 17.57	8.37	„ 0 3.79	0.51	„ 46 54.39	„ 3.89	46 56.09	„ 5.89	„ 0.065
25	L	29.706	102	„ 17.67	7.89	„ 1 29.78	0.36	„ 46 51.64	„ 8.64	47 6.54	„ 5.84	„ 3.165
28	L	30.034	83.3	„ 17.85	8.37	„ 7 10.84	+0.05	„ 47 1.95	„ 5.35	46 58.05	„ 7.75	„ 3.275

Mean		66 46 59.21	47 8.26	47 4.673	47 9.968	47 5.528
Polar point per circumpolar stars		„ 14 37.14	14 41.05	14 39.49	14 41.58	14 39.81
Mean S.P.D. of Tropic of Capricorn	66° 32′ 17″.208					
Mean S.P.D. of Cancer from last Solstice	113 27 43.42	66 32 22.07	32 27.21	32 25.18	32 28.39	32 25.718
Half diff. mean obliquity, Jan. 1, 1828	23 27 43.108			Luni-solar nutation		−8.51

The mean of all the observations derived from the upper limb is 66° 32′ 15″.98, from the lower limb 66° 32′ 18″.215, the mean of the two is 66° 32′ 17″.096, which gives for obliquity 23° 27′ 43″.162; this is probably the most correct way to proceed. From these observations it appears that I observe the Sun's apparent diameter too great.

Northern Solstice, June 1828.

1828.	Limb.	Barom.	Ther.	Observed South Polar Distance.	Refract. Parallax.	Semidiameter.	Reduction to Solstice.	Corr. for Sun's Lat.	Apparent Obliquity of Ecliptic.
		inches.	°	° ′ ″	′ ″	′ ″	° ′ ″	″	° ′ ″
June 2	U	30.03	59	111 53 10.9	1 16.82	15 47.5	1 17 13.7	−0.82	23 27 27.58
4	U	29.90	58	112 8 6.5	„ 17.14	„ 47.1	1 2 17.3	0.77	„ „ 37.2
6	L	29.76	57	„ 53 12.55	„ 19.44	„ 46.95	0 48 54.6	0.57	„ „ 38.4
7	L	29.49	58.2	„ 59 16.3	„ 18.79	„ 46.8	„ 42 48.9	0.3	„ „ 36.89
9	L	29.47	62	113 10 14.4	„ 18.67	„ 46.7	„ 31 48.8	0.17	„ „ 35.0
10	L	29.75	56	„ 15 6.5	„ 20.90	„ 46.55	„ 26 55.1	−0.0	„ „ 39.55
11	U	29.71	56	112 48 0.3	„ 19.15	„ 46.42	„ 22 25.5	+0.17	„ „ 31.54
13	U	30.06	50	„ 55 51.7	„ 21.71	„ 46.30	„ 14 39.65	0.31	„ „ 39.66
14	L	29.99	57.3	113 30 37.7	„ 22.19	„ 46.22	„ 11 23.59	0.42	„ „ 37.26
15	L	29.65	70	„ 33 28.0	„ 18.86	„ 46.13	„ 8 31.9	0.49	„ „ 33.12
16	U	29.69	66.5	„ 4 22.6	„ 18.17	„ 46.05	„ 6 5.04	+0.53	„ „ 32.39
17	L	30.05	60	„ 37 53.1	„ 22.29	„ 45.97	„ 4 2.95	0.50	„ „ 32.87
18	L	30.18	56.5	„ 39 37.45	„ 23.74	„ 45.88	„ 2 25.57	0.49	„ „ 41.37
19	U	30.35	58.2	„ 9 8.5	„ 21.97	„ 45.8	„ 1 12.98	0.43	„ „ 29.71
20	U	29.295	58	„ 9 58.7	„ 21.85	„ 45.8	„ 0 25.21	0.28	„ „ 31.84
21	L	30.27	60	„ 41 51.3	„ 23.12	„ 45.7	„ 0 2.25	+0.16	„ „ 31.13
22	U	30.23	65.5	„ 10 19.1	„ 20.31	„ 45.7	„ 0 4.08	0.04	„ „ 29.23
23	L	30.18	70	„ 41 26.65	„ 21.13	„ 45.6	„ 0 30.72	−0.08	„ „ 32.82
25	U	30.25	58.3	„ 7 38.6	„ 21.49	„ 45.6	„ 2 38.23	0.38	„ „ 23.54
26	L	30.22	61.5	„ 37 37.15	„ 22.99	„ 45.6	„ 4 18.92	0.53	„ „ 32.93
28	L	30.27	62.5	„ 32 59	„ 22.69	„ 45.6	„ 8 53.24	−0.75	„ „ 28.58
29	L	30.15	66	„ 30 7.4	„ 21.14	„ 45.5	„ 11 49.12	0.81	„ „ 31.35
30	U	30.13	58	112 55 20.6	„ 20.48	„ 45.5	„ 15 18.12	0.83	„ „ 33.87
July 2	U	29.86	61	„ 47 29	„ 18.66	„ 45.5	„ 22 59.4	0.73	„ „ 31.83
4	L	29.82	54.5	113 9 32.15	„ 21.00	„ 45.5	„ 32 27.2	0.52	„ „ 34.23
5	U	30.14	57	112 32 42.8	„ 19.37	„ 45.5	„ 37 47.0	−0.31	„ „ 34.36
6	U	30.25	57	„ 27 0.7	„ 19.49	„ 45.6	„ 43 31.0	0.15	„ „ 36.65
7	U	30.01	55.5	„ 20 52.8	„ 18.74	„ 45.6	„ 49 38.7	−0.00	„ „ 35.8

	°	′	″
Mean by upper limbs	23	27	32.37
Mean by lower limbs		27	34.71
Mean of centre	23	27	33.54
Luni-solar nutat. and reduct. to Jan. 1, 1828			+9.5
Mean obliquity, Jan. 1, 1828	23	27	43 04

In this Solstice the Polar Point had been previously applied to the Observations.

The Solstice for December 1828, which was observed alternately direct and by reflection, has been already recorded, page 11, amongst the Observations for the Latitude.

Observations of Planets.

1. Inferior Conjunctions of Venus.

Observations of the inferior Conjunction of Venus, December 1826, with the Mural Circle.

The following South Polar Distances of Venus observed with the mural circle are neither corrected for refraction nor parallax. In the Observations after conjunction, the interval between the transits is to be deducted from the sun's culmination on the next following day, in order to have the transit of Venus on the given day. From December 18, till the 28th, the weather was unfavourable.

Before Conjunction.						After Conjunction.					
1826.	Barom.	Therm.	Observed S. P. D. of Venus.	Limb.	Interval between the Transits of ♀ 1st Limb and ⊙ Centre.	1826.	Barom.	Therm.	Observed S. P. D. of Venus.	Limb.	Interval between the Transits of ♀ 2nd Limb and ⊙ Centre.
	inches.	°	° ′ ″		h m s		inches.	°	° ′ ″		h m s
Dec. 1	29.72	100	64 18 42.84	U	2 15 22.9	Dec. 28	29.95	71.5	70 19 57.14	U	0 34 21.66
3	30.26	71	64 38 32.39	U	2 7 8.77	29	29.90	73	70 32 42.14	U	0 41 4.84
4	30.15	75	64 49 50.52	L	2 2 45.27	Jan. 3	29.51	89	71 27 43.12	U	1 12 51.95
5	29.90	84	65 0 28.32			4	29.45	79.5	71 36 52.95	U	1 18 46.82
6	29.87	86	65 11 29.26	L	1 53 21.66	5	29.51	79.5	71 45 13.62	U	1 24 31.27
7	29.97	89	65 21 49.44	U	1 48 23.29	6	29.75	80	71 52 53.94	U	1 30 5.7
10	29.72	82	65 58 28.6	L	1 32 20.96	7	29.72	78.2	71 59 54.21	U	1 35 29.62
11	29.84	84	66 10 50.57	L	1 26 37.81	8	29.873	78	72 6 9.37	U	1 40 42.95
12	30.00	75	66 23 43.18	L	1 20 43.71	9	29.79	86	72 11 42.77	U	1 45 45.35
14	30.074	78	66 49 2.45	U	1 8 27.35	10	29.82	82	72 16 40.37	U	1 50 36.65
15	30.214	78	67 2 37.8	U	1 2 4.79						
16	30.18	78	67 16 28.49	U	0 55 34.61						
17	30.02	80	67 30 43.07	U							

On December the 14th, 15th, 16th, 17th and 18th, I had repetitions on Venus about the meridian, with Reichenbach's Circle, of which the abstract is subjoined.

1826.	Corr. Zen. Dist.	Limb.	Reduct. to the Meridian.	Change of Declination.	Semidiameter.	Merid. Zenith Distance.
Dec. 15	° ′ ″ 11 41 40.3	Cent.	— 4′ 49.94	+ 10.5	.....	° ′ ″ 10 52 0.86
	11 39 30.5	Cent.	— 47 18.64	— 10.9	.....	11 52 0.96
Dec. 16	11 50 59.61	U	— 45 50.76	+ 10.77	+ 30″	11 5 49.62
	11 10 24.81	Cent.	— 4 35.63	— 3.0	.....	11 5 46.18
Dec. 17	11 25 40.66	Cent.	— 5 54.61	— 3.6	.....	11 19 42.45
Dec. 18	11 54 29.3	Cent.	20 29.95	— 7.7	.....	11 33 51.65

The above Zenith Distances are corrected for Refraction, but not for Parallax. The Reduction to the Meridian will serve to correct the Parallax. The culminations of Venus observed with the transit, have been corrected for semi-diameter, and the hour angle thence deduced is corrected for the acceleration of Venus above the fixed stars, which is here additive. It depends upon the relative situation of the Sun and Venus, whether in the repetitions left and right the planet can always be observed on the same side of the wire, or whether it must be observed alternately on different sides. The mean arc will be accordingly the zenith distance of the centre, or that of one of the limbs.

Inferior Conjunction of Venus, July and August 1828, observed with the Mural Circle and Transit at Paramatta.

The lower limb of Venus has been observed throughout. The observed Right Ascensions are those of the first limb before the conjunction, but after conjunction those of the last limb of Venus. The Sun's Parallax has been subtracted from his Refraction, but to Venus no Parallax has been applied.

1828.	Barom.	Therm.	Stars' Names.	Observed Apparent R.	Observed S. P. D.	Refraction.	Sun's Semidiameter.	Correct. S. P. D. of Stars' Apparent Place.
	inches.	°		h m s	° ′ ″	′ ″		° ′ ″
July 11	30.05	50	Sirius		73 30 18.4	0 18.00	.....	73 30 36.1
July 12	30.05	53	Sun's upp. limb	7 24 55.31	111 44 23.525	1 17.56	.....	112 1 26.89
	30.00	54	Venus's low.limb	8 57 15.38	103 59 33.65	1 3.62	.....	104 0 37.27
	29.98	51	Arcturus	14 7 50.83	110 3 40.25	1 19.4	.....	111 4 59.6
	29.96	52	Sirius	6 37 34.27	73 30 21.60	0 17.94	.....	73 30 39.54

1828.	Barom.	Therm.	Stars' Names.	Observed Apparent R.	Observed S. P. D.	Refraction.	Sun's Semidiameter.	Correct. S. P. D. of Stars' Apparent Place.
	inches.	°		h m s	° ′ ″	″	″	° ′ ″
July 13	29.936	53.5	Sun's upp. limb	7 28 59.85	111 35 52.9	1 16.7	15 45.8	111 52 55.4
	29.936	57.2	Venus's low.limb	8 56 6.95	103 49 58.2	1 2.81	.....	103 51 1.0
	29.91	50	Sirius	6 37 34.09	73 30 22.25	0 17.99	.....	73 30 40.24
July 14	29.90	56	Sun's low. limb	7 33 3.75	111 58 37.1	1 16.25	„ 45.9	111 44 7.5
	....	....	Venus's low.limb	8 54 48.12	103 40 56.25	1 2.53	.....	103 41 58.5
	30.05	56	Sirius	6 37 34.11	73 30 22.5	0 17.85	.....	73 30 40.3
July 15	30.02	60	Sun's upp. limb	7 37 6.72	111 17 57.6	1 14.86	„ 45.9	111 34 58.36
	30.00	60.8	Venus's low.limb	8 53 20.11	103 32 28.4	1 1.79	.....	103 33 30.2
	30.00	52	Arcturus	14 7 51.05	110 3 41.3	1 19.28	.....	110 5 0.6
	29.99	57	Sirius	6 37 33.99	73 30 24.7	0 17.78	.....	73 30 40.35
July 16	29.94	60	Sun's upp. limb	7 41 9.63	111 8 30.3	1 14.15	„ 46	111 25 30.45
	29.89	61	Venus's low.limb	8 51 43.44	103 24 44.08	1 1.3	.....	103 25 45.4
	29.83	57	Arcturus	14 7 50.96	110 3 38.82	1 18.02	.....	110 4 56.84
	29.74	59.5	Aldebaran	4 26 4.88	106 8 15.5	1 7.26	.....	106 9 22.8
	29.703	65.6	Sirius	6 37 34.35	73 30 24.75	0 17.56	.....	73 30 42.3
July 17	29.68	67.3	Sun's low. limb	7 45 11.97	111 30 6.45	1 13.35	„ 46	111 15 33.75
	....	69	Venus's low.limb	8 49 58.92	103 17 17.0	0 59.6	.....	103 18 16.6
	29.65	63	Arcturus	14 7 51.09	110 3 43.7	1 16.55	.....	110 5 0.25
	29.65	60	Antares	16 18 55.69	63 57 18.02	0 7.71	.....	63 57 25.73
	29.85	59	Aldebaran	4 26 5.95	106 8 15.15	1 7.3	.....	106 9 22.45
July 18	29.844	66	Sun's low. limb	7 49 13.71	111 19 48.4	1 13.47	„ 46.1	111 5 15.77
	....	66.5	Venus's low.limb	8 48 6.17	103 10 33.85	1 0.0	.....	103 11 33.85
	29.87	62	Vindemiatrix	12 53 38.32	101 52 8.67	0 58.95	.....	101 53 7.6
	29.90	59	Arcturus	14 7 50.81	110 3 39.1	1 17.89	.....	110 4 57.0
	30.02	45.2	Antares	16 18 55.37	106 8 13.4	1 9.9	.....	16 9 23.3
	30.02	55	Sirius	6 37 34.47	73 30 19.75	0 17.87	.....	73 30 37.62
July 19	29.995	60.2	Sun's upp. limb	7 53 14.75	110 37 36.1	1 12.8	„ 46.2	110 54 35.1
	29.98	60	Venus's low limb	8 46 6.02	103 4 29.75	1 0.86	.....	103 5 30.61
	29.96	55.5	Vindemiatrix	12 53 38.55	101 52 6.45	0 58.91	.....	102 53 5.36
	29.95	53	Arcturus	14 7 50.57	110 3 40.8	1 18.89	.....	110 4 59.69
	29.95	51	Antares	16 18 56.82	63 57 18.05	0 7.92	.....	63 57 25.97
July 20	29.622	55.3	Aldebaran	4 26 4.87	103 8 4.2	1 7.56	„ 46.26	103 9 11.76
	29.622	55.3	Sirius	6 37 34.33	73 30 4.1	0 17.61	.....	73 30 21.71
July 21	29.59	57	Sun's upp. limb	8 1 15.13	110 15 2.6	1 17.94	„ 46.32	110 32 6.86
	29.58	57	Venus's low.limb	8 41 44.30	102 54 5.8	1 0.03	.....	102 55 5.83
	29.59	52	Arcturus	14 7 51.26	110 3 30.1	1 18.18	.....	110 4 48.28
July 22	29.60	56.5	Sun's upp. limb	8 5 14.89	110 3 36.45	1 10.62	„ 46.45	110 20 33.52
	29.604	56.5	Venus's low.limb	8 37 34.95	102 50 58.02	1 0.05	.....	102 51 58.07
	29.94	48	Aldebaran	4 26 5.44	106 8 6.82	1 9.34	.....	106 9 16.16
	29.94	54.5	Sirius	6 37 34.39	73 30 18.5	0 17.83	.....	73 30 36.33
July 23	29.96	59	Sun's low. limb	8 8 13.31	110 23 7.5	1 12.17	15 46.51	110 9 33.13
	29.96	60.5	Venus's low.limb	8 37 0.33	.....	.....	.....	

1828.	Barom.	Therm.	Stars' Names.	Observed Apparent Rt.	Observed S. P. D.	Refraction.	Sun's Semidiameter.	Corrected S. P. D. of Stars' Apparent Place.
	inches.	°		h m s	° ′ ″	′ ″	′ ″	° ′ ″
July 23	30.15	41.2	Aldebaran	4 26 4.63	106 8 12.0	1 10.40	.....	106 9 22.4
	30.10	50.7	Sirius	6 37 34.72	73 30 25.75	0 17.95	.....	73 30 43.70
24	30.094	57.5	Sun's low. limb	8 13 11.88	110 10 47.1	1 12.18	15 46.57	109 56 12.71
	30.088	57	Venus's low.limb	8 34 31.41	102 43 32.5	1 0.66	.....	102 44 33.16
	30.072	41.3	Aldebaran	.....	106 8 14.5	1 10.56	.....	106 9 25.06
25	29.985	56	Sun's low. limb	8 17 9.11	110 58 6.2	1 14.65	15 46.7	110 43 34.15
			Venus's low.limb	8 31 58.54	102 41 12.1	1 0.58	.....	102 42 12.68
	30.18	40	Aldebaran	4 26 4.87	106 8 11.1	1 10.99	.....	106 9 22.09
	30.214	53.7	Sirius	6 37 34.33	73 30 22.82	0 18.03	.....	73 30 40.85
26	30.200	58	Sun's upp. limb	8 20 6.78	109 13 33.6	1 9.81	15 46.8	109 30 30.25
			Venus's low.limb	.....	102 39 30.2?	1 59.84	.....	102 40 30.04
	30.338	34	Aldebaran	4 26 5.49	106 8 11.3	1 12.19	.....	106 9 23.49
	30.38	55	Sirius	6 37 34.01	73 30 23.8	0 18.09	.....	73 30 41.89
27	30.24	43.7	α Orionis	5 45 53.49	97 21 3.02	1 51.83	15 47.0	97 21 54.85
	30.24	47	Sirius	6 37 34.45	73 30 21.95	0 17.92	.....	73 30 39.87
28	30.176	57	Sun's upp. limb	8 28 58.93	108 46 39	1 8.59	15 47.1	109 3 34.69
29	30.012	56.7	Sun's low. limb	8 32 53.36	109 4 11.15	1 9.07	15 47.2	108 49 33.02
30	30.117	54	Sun's low. limb	8 36 48.40	108 49 57.6	1 9.07	15 47.3	108 35 19.37
	30.264	42	α Orionis	5 45 53.21	97 21 6.8	1 52.05	.....	97 21 58.85
	30.261	46	Sirius	6 37 34.46	73 30 22.8	0 18.03	.....	73 30 40.83
	30.25	55	Venus's low.limb	8 16 30.92	102 39 23.32	1 1.15	.....	102 40 24.47
31	30.25	55	Sun's low. limb	8 40 42.42	108 35 18.25	1 8.52	15 47.4	108 20 39.37
	30.245	49.3	Sirius	6 37 34.53	73 30 28.3	0 18.22	.....	73 30 46.52
	30.224	55	Venus's low.limb	8 14 1.61	102 40 54.95	1 1.19	.....	102 41 56.14
Aug. 1	30.224	55	Sun's upp. limb	8 44 35.99	107 48 51.0	1 6.52	15 47.5	108 5 45.02
	30.234	34.5	Aldebaran	5 26 5.41	106 8 13.85	1 11.87	.....	106 9 25.72
	30.250	51.3	Sirius	6 37 34.38	73 30 25.8	0 18.14	.....	73 30 43.94
	30.25	56	Venus	8 11 36.72	102 42 48.25	1 1.16	.....	102 43 49.31
2	30.233	57	Sun's upp. limb	8 48 29.30	107 33 40.7	1 5.5	15 47.7	107 50 33.9
	30.25	37.2	Aldebaran	4 26 5.92	106 8 12.8	1 11.54	.....	106 9 24.34
	30.25	49.4	Sirius	6 37 34.71	73 30 27.57	0 18.21	.....	73 30 45.78
	30.228	56	Venus's low.limb	8 9 15.83	102 45 7.85	1 1.22	.....	102 46 9.07
3	30.22	57	Sun's upp. limb	8 52 21.12	107 18 10.42	1 5.1	.....	107 35 3.37
			Aldebaran	4 26 5.7				
	30.233	49	Sirius	6 37 34.7	73 30 30.7	0 18.2	.....	73 30 48.9
	30.23	56	Venus's low.limb	8 7 1.22	102 47 53.7	1 1.33	.....	102 48 55.03
4	30.175	60	Sun's low. limb	8 56 12.92	107 34 7.55	1 5.15	15 48.0	107 19 24.7

Inferior Conjunction of Venus, July and August 1828, observed with the Repeating Circle.

1828.	Mer. Zen. Dist. of the lower limb of Venus corrected for Refraction.	1828.	Mer. Zen. Dist. of the lower limb of Venus corrected for Refraction.
	° ′ ″		° ′ ″
July 16	47 14 30.9	July 24	46 33 13.3
17	„ 7 1.9	25	„ 31 11.6
18	46 59 17.3	26	„ 29 22.3
19	„ 54 28.5	30	„ 29 5.8
21	„ 44 9.2	31	„ 30 28.3
22	„ 39 56.8	Aug. 1	„ 32 38.8
23	„ 36 13.4	2	„ 34 59.1

N.B. Parallax has not been applied.

2. *Oppositions of Mars observed at Paramatta.*

Opposition of Mars, February 1822.

These observations are the means of numerous observations made about the meridian, and reduced to the Time of the Culmination of Mars.

1822.	Stars' Names.	Mars has + more or − less Right Ascension than Star.	Mars North or South of Star.
		′ ″	′ ″
Feb. 15	ι Leonis	− 1 47.328	2 35.15 N.
	446 Mayer	+ 1 38.915	9 19.2 S.
16	446 Mayer	+ 0 6.049	0 34.84 S.
17	446 Mayer	.....	8 32.07 N.
	Anon.	.....	16 19.73 S.
23	H. C. pag. 282	− 4 36.239	1 15.88 S.

Mars must have eclipsed 446 Mayer on the 16th February.

Opposition of Mars, May 1826.

Comparisons of Mars with 2 α Libræ.

1826.	Diff. of R.	Diff. of Declin.
	m s	′ ″
May 5	+ 5 40.1	25 43.3 S.
6	+ 4 10.13	21 54.6
7	.....	17 55.7
8	+ 1 10.0	13 54.8
10	.....	5 54.5
12	.....	2 2.3 N.

Observed Polar Distances.

1826.	S. P. D. of Mars Centre corrected for Refraction.
	° ′ ″
May 5	74 15 12.2
6	„ 19 6.5
7	„ 23 8.5
8	„ 27 11.5
10	„ 35 2.9
12	„ 43 1.2

Opposition of Mars, June and July 1828, observed with the Mural Circle and Transit at Paramatta.

1828.	Barom.	Therm.	Stars' Names.	Observ. App. R.	Obs. S. P. D.	Refraction.	True S. P. D.
	Inches.	°	h m s		° ′ ″	″	° ′ ″
June 20	30.27	37	φ Sagittarii	18 34 58.44	62 50 34.4	7.00	62 50 41.4
			σ Sagittarii	18 44 39.59	63 29 57.8	7.78	63 30 5.58
			Mars	18 54 2.67	62 46 25.55	6.94	62 46 32.49
			τ Sagittarii	.....	62 5 8.8	6.19	62 5 14.99
21	30.27	37	φ	18 34 58.58	62 50 30.8	7.0	62 50 37.8
			σ	18 44 39.58	63 29 58.2	7.78	63 30 5.98
			Mars	18 52 58.19	62 41 9.5	6.84	62 41 16.14
			τ	.....	62 5 15.9	6.19	62 5 22.09
26	30.27	51	φ	18 34 58.65	62 50 31.3	6.81	62 50 38.11
			σ	18 44 39.43	63 29 52.5	7.56	63 30 0.06
			Mars	18 47 6.65	62 15 33.3	6.21	62 15 39.51
			τ	18 56 15.35	62 5 13.0	6.04	62 5 19.04
27	30.31	48.7	φ	18 34 58.25	62 50 20.3	6.84	62 50 27.14
			Mars	18 45 51.78	62 10 49.3	6.17	62 10 55.47
			τ	18 56 15.75	62 5 15.6	6.07	62 15 21.67
28	30.21	55	φ	18 34 58.42	62 50 30.0	6.89	62 50 36.89
			Mars	18 44 35.61	62 6 5.82	6.00	62 6 11.82
			τ	18 56 15.74	62 5 13.3	5.98	62 5 19.28
29	30.13	49	φ	18 34 58.54	62 50 29.4	6.80	62 50 36.2
			Mars	18 43 18.32	62 1 34.7	5.97	62 1 40.67
			τ	18 56 15.84	62 5 15.2	6.04	62 5 21.24
July 1	29.75	49	φ	.....	62 50 32.4	6.69	62 50 39.09
			Mars	18 15 40.97	61 52 54.25	5.75	61 53 0.00
			σ	18 44 39.53	63 29 58.4	7.44	63 50 5.86
			τ	18 56 15.5	62 5 19.22	5.96	62 5 25.18
3	29.75	47	φ	.....	62 50 36.45	6.77	62 50 43.22
			Mars	18 38 1.86	61 44 51.3	5.65	61 44 57.95
			σ	18 44 39.66	63 29 59.7	7.39	63 30 7.09
			τ	18 56 15.69	62 5 21.4	5.90	62 5 27.30
4	30.04	49	φ Sagittarii	.....	62 50 43.2	6.76	62 50 49.96
			Mars	18 36 42.62	61 41 10.25	5.52	61 41 15.77
			σ	18 44 39.42	63 29 55.85	7.53	63 30 3.38
			τ	18 56 15.54	62 5 21.5	5.98	62 5 27.48
5	30.213	42.2	Mars	18 35 22.57	61 37 31.7	5.67	61 37 37.37
			σ	18 44 39.695	63 30 1.6	7.68	63 30 9.28
			τ	18 56 15.69	62 5 24.4	6.14	62 5 30.54
6	30.10	36.8	Mars	18 34 3.39	61 34 11.5	5.64	61 34 17.14
			σ	18 44 39.61	63 30 2.0	7.73	63 30 9.73
			τ	18 56 15.78	62 5 24.7	6.18	62 5 30.88
9	29.714	51	Mars	18 30 9.69	61 25 8.35	5.38	61 25 13.73
			φ	18 34 58.39	62 50 35.1	6.68	62 50 41.78
			σ	18 44 39.64	63 30 0.3	7.40	63 30 7.70
			τ	18 56 15.77	62 5 19.85	6.04	62 5 25.89

The Moon.

The Moon's orbit, during the intervals between her transits over the meridians of the Observatories at Paramatta and in Europe, is sufficiently known to deduce her Parallax from the following South Polar Distances observed at Paramatta. These South Polar Distances answer to the culminations of the Moon's centre, and are different from the times for which the Moon's right ascensions are given in page 28, which correspond to the transit of the first or second limb, and must be reduced to the former, by applying the time in which the Moon's semidiameter passes the meridian in apparent solar time.

The refraction has been applied, but semidiameter and parallax have not.

South Polar Distances of the Moon.

1822.	Barom.	Therm.	Refract.	South Pol. Dist.	Limb.
	inches.	°	′ ″	° ′ ″	
May 3	30.21	53	0 28.3	82 3 16.7	L
27	29.87	58.5	0 57.4	101 26 52.0	L
28	30.00	55	0 47.07	95 28 51.6	L
29	29.93	48.5	0 38.26	89 29 10.8	L
30	29.75	49	0 30.12	83 40 16.9	L
31	29.57	54	0 22.98	78 12 37.2	L
June 1	29.70	52	0 17.59	73 17 16.9	L
2	29.92	48	0 14.16	69 5 38.08	L
3	29.71	51	0 9.72	65 50 25.2	L
14	30.00	42	1 4.84	103 51 29.6	L
28	30.00	50	0 19.36	74 44 11.0	L
29	29.99	48	0 14.56	70 17 26.8	L
30	30.00	45.7	0 10.8	66 43 25.5	L
July 25	30.09	51	0 21.67	76 33 15.1	L
26	30.22	50	0 16.03	71 46 23.2	L
29	29.85	50.7	0 7.1	63 13 38.0?	L
Aug. 11	30.03	41.2	1 50.2	118 1 22.1	L
23	29.87	60.7	0 13.19	69 19 49.6	L
24	30.07	57.2	0 9.85	65 58 27.9	L
25	30.04	57.4	0 7.66	63 46 38.7	L
29	29.74	47	0 12.09	68 1 42.2	U
Sept. 11	30.00	50	1 20.78	110 28 5.98	U
18	29.71	75	0 19.54	75 52 20.95	L
19	29.52	73	0 14.59	71 8 29.0	L
20	29.80	70	0 10.82	67 20 37.5	L
21	29.38	67.6	0 8.15	64 39 14.7	L
22	29.33	69.2	0 6.78	63 13 10.8	L
23	29.63	64	0 6.26	62 38 7.1	U
30	29.53	58.3	0 44.0	94 14 47.3	U
Oct. 8	29.77	60.8	1 22.1	111 42 32.1	U
9	29.95	60	1 9.4	106 51 39.5	U
26	29.82	59	0 30.61	84 27 56.25	U
27	29.89	56	0 39.79	90 56 25.6	U
28	30.05	52.5	0 50.89	97 35 53.2	U

1822.	Barom.	Therm.	Refract.	South. Pol. Dist.	Limb.
	inches.	°	′ ″	° ′ ″	
Nov. 5	29.78	60	1 12.36	108 12 6.2	U
7	29.77	63.2	0 48.18	96 51 43.0	U
9	30.10	67	0 30.63	84 51 3.2	U
10	30.03	76	0 23.45	79 12 44.5	U
25	30.00	67	0 55.44	100 52 28.44	U
Dec. 24	29.92	77	1 14.02	109 44 2.67	U
25	29.92	77	1 27.33	114 6 2.03	U
26	29.92	70.2	1 40.81	117 23 59.4	L
1823.					
Feb. 21	29.83	69	1 36.55	116 19 8.15	L
Mar. 21	29.65	71.5	1 27.48	114 5 27.83	L
23	29.99	62	1 3.44	104 23 32.5	L
Apr. 15	29.90	72	1 39.0	117 1 55.9	U
17	29.81	68.5	1 31.1	114 51 14.8	L
18	29.705	72.5	1 17.3	110 59 8.0	L
19	30.152	58	1 7.94	105 57 34.0	L
May 19	29.95	58	0 37.61	89 30 58.81	L
21	29.85	58	0 22.75	77 58 46.7	L
June 15	29.692	58	0 39.90	91 19 4.75	L
1826.					
May 18	29.768	42	0 28.58	82 8 43.53	L
20	30.09	38	0 18.03	73 3 3.81	L
June 13	30.21	43.5	0 39.06	89 31 21.16	L
14	30.18	44	0 31.65	84 15 35.07	L
16	29.91	57	0 19.12	74 49 36.35	L
26	30.14	29	0 49.29	95 12 14.8	L
27	30.22	29.5	0 56.8	99 36 7.05	L
28	30.00	33.0	1 5.37	103 34 17.67	L
29	30.05	50	1 10.08	106 28 49.28	L
July 13	30.06	46.5	0 21.65	76 24 24.55	L
15	30.13	42	0 14.73	70 9 3.45	L
16	30.10	31.5	0 13.81	69 3 24.71	L

Table (continued).

1826.	Barom.	Therm.	Refract.	South Pol. Dist.	Limb.	1827.	Barom.	Therm.	Refract.	South Pol. Dist.	Limb.
	inches.	°	′ ″	° ′ ″			inches.	°	′ ″	° ′ ″	
July 17	30.08	30	0 14.28	69 31 43.35	L	Sept. 3	30.002	48	0 23.07	77 45 38.57	U
24	30.03	49	0 52.37	97 39 26.29	L	15	30.01	47	1 12.46	107 17 29.51	U
25	29.67	39	1 0.26	101 51 42.26	L	26	29.95	72.5	0 15.29	71 39 8.01	L
26	29.55	38.5	1 8.3	105 32 10.0	L	30	30.114	52	0 21.55	76 29 0.87	U
27	29.97	43	1 16.16	108 33 9.3	L	Oct. 1	30.003	61	0 25.65	80 27 32.55	U
28	30.03	46	1 22.45	110 46 36.45	L	30	29.81	74	0 34.28	88 6 17.15	U
Aug. 11	29.85	57	0 15.02	71 1 6.27	L	Dec. 31	30.07	60	1 17.64	109 53 42.66	U
12	30.06	54	0 13.56	69 26 22.96	L						
22	29.50	46	1 3.28	103 52 9.6	L	1828.					
Sept. 16	29.65	57	0 43.28	93 36 5.03	L	Jan. 28	30.12	60	1 17.06	109 39 18.78	U
Nov. 9	30.10	57	0 38.8	90 8 57.4	U	29	29.98	65.6	1 13.31	108 46 0.2	U
Dec. 12	30.03	63	1 17.10	109 54 44.35	U	Feb. 3	29.82	64	0 43.09	93 41 53.99	U
						5	29.64	63	0 31.1	85 13 7.72	U
1827.						24	30.03	68.5	1 15.17	109 29 38.37	U
Feb. 5	29.73	70	1 15.04	109 52 2.19	U	Mar. 31	29.65	67	0 30.08	84 34 18.88	L
16	29.60	57	0 22.5	77 54 4.9	U	Apr. 25	30.32	51	0 46.98	94 53 5.70	L
Mar. 17	30.04	62.5	0 16.36	72 19 52.01	U	26	29.95	58	0 39.36	90 42 30.61	L
18	30.03	57.5	0 14.40	70 22 43.1	U	May 23	30.23	56	0 42.74	92 38 47.70	L
Apr. 12	29.64	51.5	0 22.15	77 15 58.85	U	25	30.14	56	0 30.80	84 13 2.0	L
May 3	29.77	65	1 5.99	105 55 4.44	L	26	29.99	51	0 21.64	76 36 7.76	L
4	29.91	53.3	1 0.57	102 38 31.27	L	June 21	30.25	55	0 33.57	86 12 41.67	L
6	30.09	57	0 45.11	94 19 11.9	L	27	30.31	49	0 16.53	71 56 26.75	L
7	30.07	59.2	0 37.75	89 34 6.77	L	28	30.21	55	0 18.15	73 38 53.10	L
9	30.124	53	0 25.65	80 1 23.32	L	July 3	29.72	37.7	0 46.80	94 37 29.52	L
June 2	30.204	55	0 48.49	96 10 18.1	L	5	30.25	40.7	1 3.07	102 44 20.42	L
7	30.14	48.5	0 19.011	74 14 56.8	L	19	29.96	55	1 30.29	83 55 23.61	L
13	29.86	42	0 26.45	80 24 42.67	L	21	29.59	49	1 21.56	76 42 15.26	L
July 3	30.14	48.5	0 25.68	79 50 36.2	L	22	29.734	50	1 18.4	73 59 14.0	L
4	30.35	46	0 21.32	75 56 19.77	L	23	30.07	46	1 16.82	72 14 16.54	L
Aug. 3	30.12	52	0 14.98	70 42 48.38	L	24	30.09	40.7	1 16.46	71 43 24.9	L
16	30.36	45	1 23.39	110 43 42.31	L	Aug. 20	30.10	50	1 16.42	71 58 12.47	L
17	30.10	46.5	1 21.4	110 23 49.3	L	21	30.11	51	1 16.59	72 9 27.01	L
31	30.15	55	0 15.19	70 58 44.89	L	22	30.20	49	1 18.40	73 41 37.97	L
Sept. 1	30.30	51.4	0 16.12	71 38 27.02	U	Oct. 18	29.98	58	1 25.75	80 23 55.8	U
2	30.10	46.7	0 18.94	74 9 31.14	U						

Comets.

A. The Comet of Encke in 1822.

By the assistance of Professor Encke's Ephemeris of this Comet, I was enabled to re-discover it on the 22nd of June 1822, and shall now give my observations thereof more correctly reduced than they were transmitted by me at first for insertion in Professor Schumacher's *Astronomische Nachrichten*.

1822.	Sidereal Time at Paramatta.	Difference of Right Ascension.		Comet North or South of Star.
	h m s		m s	p
June 2	10 39 25	a	−0 8.11	9.65 S.
3	11	b	+0 18.0	10.86 S.
4	11 3	c	+0 50.0	14.543 S.
5	11 8	d	+0 32.8	5.345 N.
	11 25	d		4.9 N.
6	11 7 38.1	e	+3 17.75	5.205 N.
7	11 3 10	f	+0 43.35	18.678 N.
	11 33	1 ξ Gem.	−3 26.0	2.965 N.
	11 33	g	−4 46	
8	11 17 25	32 Gem.	−1 41	19.224 S.
	11 17 25	g	−1 3.6	30.529 S.
9	11	Anon.	−0 9	8.245 S.
		Anon.	+0 48	12.0 N.
10	11 20	i	−0 30	−26.714 S.
	11 20	k	−1 44	16.674 S.
	11 20	l	−1 54	
11	11 24 39	m	−0 40.6	
		n	−0 47.17	−18.491 N.
		o	−1 11.5	25.681 N.
12	11 40	p	+0 8.28	+24.664 N.
		q	+0 32.89	41.334 N.
13	11 37 45	r	−0 42.22	0.03 N.
	11 40 32	s	−0 11.70	9.46 S.
	11 47 56	t	+3 15.5	24.364 S.

1822.	Sidereal Time at Paramatta.	Difference of Right Ascension.		Comet N. or S. of Star.
	h m s		m s	p
June 14	11 25	u	+1 2	17.945 N.
	11 47 14	y	+0 43	0.049 N.
		v	+0 25.8	5.44 N.
		x	+0 38.57	15.837 S.
	11 55	w	+1 50.7	
	12 4	w		16.61 S.
15	11 40 48	β	+1 58.7	6.038 S.
		γ	+1 53.8	6.172 N.
	12 3 27	δ	− 24.0	17.34 N.
19	11 51 20	ε	− 45.07	
	12 2 19	ε		2.847 N.
	12 15 43	ε	− 39.36	
	12 21 6	ε		2.105 N.
	12 33 41	ε	− 36.4	
	12 47 0	ε		0.79 N.
20	12 16 53	ζ	−2 6.42	
		η	−2 12.5	
	12 22 46	ζ		15.02 S.
	12 31 36	η		27.04 S.
21	12 8 27	θ	+ 31.555	
	12 10 36	θ		0.675 S.
22	13 18 46	ι	− 23.5	2.0 S.
23	12 51 36	λ	+ 20.75	
	12 52 38	κ	+1 32.44	
	12 56 8	κ		23.132 S.
	12 57 30	μ	14.5	
	13 1 30	λ		12.101 S.
	13 14 30	μ		0.533 N.

The compared fixed Stars have been designated in their order in the Latin and Greek alphabets. + means that the Comet had more, − that it had less right ascension than the Star; ε is P. VI. 144; g is 2 ξ Geminorum; k, p. 312, Hist. Cel.; l is 90 Geminorum Bode. The differences of declination are given in parts of the Micrometer, one part of which is = 65″.518.

The greater part of these Stars have been observed by myself in the Meridian, whence I have deduced their mean places for the beginning of 1823, as follows.

Stars.	Mean R. Jan. 1, 1823.	Ann. Variat.	Mean Declination Jan. 1, 1823.	Annual Variation.
	h m s	s	° ′ ″	″
a	92 46 33	52.02	17 50 13 N.	−0.966
b	93 42 25	52.04	17 4 54	−1.291
c	94 34 8	51.75	16 20 31	−1.593
d	96 12 15	51.40	15 27 35	−2.219
f	97 27 26	50.53	13 8 5	−2.600
g	98 50 14	50.496	13 4 45	−3.417
h	99 47 23	49.97		
i	100 32 11.7	49.718	11 0 0.3	−3.664
n	101 32 8.3	49.039	9 5 41.6	−4.001
o	101 38 33	48.99	8 57 57.3	−4.041
p	102 16 0.9	48.60	7 51 8.0	−4.256
s	103 12 40			
w	103 48 38	48.01	6 10 54.7	−4.779
x	104 7 42	47.99	6 9 6.0	−4.885
y	104 4 39	47.89		
β	104 47 56	47.48		
γ	104 49 4	47.40	4 27 0.2	−5.123
ε	110 - 5 23.8	45.39	1 32 45.1 S.	+6.87
ζ	111 46 30	44.93		
η	111 47 59	45.00	2 46 15.4	+7.431
δ	112 31 11.6			
κ	115 25 1	43.12	8 44 30	+8.59
λ	115 42 39	43.05	8 57 29	+8.685
μ	115 52 19	42.98	9 12 26	+8.735

The positions of the Comet are accordingly:

1822.	Sidereal Time at Paramatta.	Mean R.	Mean Declination.
	h m s	° ′ ″	° ′ ″
June 2	10 39 25	92 43 56	17 39 43
3	11	93 46 24	16 53 2
4	11 3	94 46 9	16 4 36
6	11 7 38	96 41 58	14 22 48
7	11 3 10	97 37 35	13 28 40
8	11 17 25	98 33 44	12 31 15
10	11 20 0	100 24 12	10 30 49
11	11 24 39	101 19 48	9 26 9
12	11 40 0	102 17 31	8 18 22
13	11 42 4	103 15 2	7 6 31
14	11 55 0	104 15 35	5 51 51
15	11 40 48	105 16 59	4 33 41
19	12 13 38	109 54 46	1 29 44
20	12 16 53	111 14 22	3 14 29
22	13 18 46	114 12 14	7 8
23	12 53 55	115 47 41	9 9 48.4

B. Comet of September and October 1822, in Ophiucho.

I have stated on a former occasion that I was not the first discoverer of this Comet in Paramatta; but the following original observations thereof, which have never been published before, were made by myself.

1822.	Sidereal Time at Paramatta.	Star.	Difference of R in Time.	Comet North or South of Star.
	h m s		m s	
Sept. 21	20 44 43	a	+0 46.7	
		b	−0 22.1	
		c	−0 48.9	
	20 43 56	a	.....	13′.118 S.
Sept. 23	20 15 42.1	d	+0 31.53	
		e	−0 38.43	
	20 15 08	e	.....	5′.9334 S.

1822.	Sidereal Time at Parramatta.	Star.	Difference of Ascension in Time.	Comet North or South of Star.
	h m s		m s	
Sept. 24	20 11 28	f	+ 6.3	
		g	−2 23.2	
		h	−4 43.6	
	19 54 56	f	.....	6′.730 S.
	20 6 48.7	h	.....	17.996 S.
	20 15 24.0	g	.....	3.344 N.
26	19 52 45.0	i	+1 44.3	
	19 53 51.0	m	−3 49.5	
	19 57 50.8	l	+1 39.6	
	20 1 56.0	k	+1 40.04	
	19 53 51.0	l	.....	1.933 N.
	20 16 21.0	n	.....	15.232 S.
27	21 37 45	o	+1 35.2	23.985 N.
29	19 48 32.5	p	+8 48.5	4.785 N.
	20 47 43.4	q	+6 14.73	
	20 48 16.4	r	+5 23.32	
	20 48 16.4	s	−2 24.9	
	21 7 0.0	t	.....	13.742 N.
	21 19 11.0	q	.....	16.606 N.
30	20 16 32.3	t	+4 20.5	
	20 22 51.0	u	+0 4.15	
	20 22 51.0	v	+0 2.10	
	20 14 49.5	u	.....	16·738 S.
	20 18 27.1	t	.....	7.24 N.
	20 19 55.5	v	.....	18.15 S.
Oct. 8	20 51 56	w	+4 3	
		x	+0 46	
		y	+0 45	
		z	−3 5	
	20 57 4	z	.....	5.332 S.
12	20 0 54	α	+3 25.5	
		β	+2 33.83	
		γ	+0 36.83	
	20 5 45	δ	+1 26.3	
	21 0 50	δ	.....	13.988 N.
	21 12 01.5	α	.....	12.617 N.
	γ is 12′.474 S. of δ, and β 11′.734 S. of α.			
16	21 18 34.6	ε	−0 51.54	
	21 29 47.8	ζ	−5 18.07	
	21 12 15	ε	.....	15.499 N.
	21 31 3.6	ζ	.....	4.154 S.
17	21 30 55	η	−1 2.92	20.14 S.

1822.	Sidereal Time at Parramatta.	Star.	Difference of Ascension in Time.	Comet North or South of Star.
	h m s		m s	
Oct. 21	21 51 21.3	ι	−0 11.33	
	22 3 4.8	ι	.....	6′.483 S.
	22 12 17.8	θ	+0 56.9	
	22 18 57	θ	.....	8.557 S.
	22 18 57	κ	.....	In parallel.
22	21 29 26.5	λ	.....	16.798 N.
	21 32 6.3	λ	+2 11.82	
26	21 48 43.7	π	−2 11.7	
		μ	− 3.2	
	21 52 30	μ	.....	6.5 N.
	22 10 14.3	ρ	+ 34.0	13.017 S.
	22 12 15.3	ο	− 59.3	7.005 S.
	22 5 2.3	π	.....	12.947 N.
27	21 44 36	φ	+2 8.6	
		τ	−4 26.5	
	21 51 19	υ	−5 7.6	
	21 58 59.3	υ	.....	7.765 N.
	22 11 51.5	σ	−2 22.0	
	22 14 43.0	σ	.....	17.004 S.
28	21 49 10.2	τ	−4 31.6	4.092 N.
	21 51 43.3	ρ	− 20.78	
	21 46 20.0	ρ	.....	9.576 N.
29	21 52 34	ρ	− 25	19.312 S.
		ξ	+2 16.5	12.33 S.
30	21 57 35.2	χ	+1 4.7	
	22 2 51	χ	.....	17.706 N.
Nov. 2	22 40 22.7	ω	+7 39.3	
	22 39 3.9	ω	.....	20.553 S.
3	22 16 45	A	+ 26.2	
	22 17 10	A	.....	2.7106 N.
4	22 35 38	B	+3 26	14.907 N.
7	22 45 20	C	+4 37.67	
	22 45 47.4	C	.....	18.039 N.
8	22 53 39	C	+4 36.17	
	22 54 2	C	.....	7.4573 S.
10	22 58 39	D	−3 50	
	23 3 46	D	.....	25.835 N.
11	23 5 46	D	−3 52	1.216 N.

Mean Positions of the above Stars for the Time of the Comparison.

Stars.	Mean Æ.	Mean Declin.	Stars.	Mean Æ.	Mean Declin.
e	is P. XVI. 85				
h	λ Ophiuchi.		ζ	243° 9′ 10.3	16° 35′ 24.2 S.
			ι	241 22 22.5	19 37 13.3
i	243° 29′ 28″	0° 25′ 55″ S.	θ	241 39 29	19 39 9.3
k	243 30 50.5	0 16 16.9 S.	κ	.....	19 46 30.3
l	243 31 10	0 8 24.9 S.	Anon.	240 49 7.8	20 56 11.1
m	244 54 44	0 27 35.2 N.	λ	241 1 2.3	20 38 40.0
n	243 29 28	0 9 49.3 N.	π	241 58 28.5	22 50 32
o H. C.	243 21 57	1 39 9 S.	φ	240 51 37.2	23 19 29.7
o Mayer	243 20 29	1 40 6	σ	241 58 30.2	22 50 32.4
p	241 15 56	3 13 44	τ	242 29 50	23 43 58
q	241 54 4	3 30 12	υ	242 40 19.3	23 16 36.7
r	242 6 30	3 35 8	ρ	241 27 15	23 49 34
s	244 3 42	3 27 12	ξ	Hist. Cel. p. 472.	
t	242 14 16	4 7 14	χ	241 2 35.3	25 1 3
u	243 18 32	3 48 39	ω	m Scorpii.	
v	243 19 3	3 47 24	A	87 Bode Scorpii.	
β	241 28 8.7	14 23 49.3	B	2 c Scorpii.	
Anon.	242 15 4.7	14 25 47.6	C	1345 Cœl. Aust.	
ε	242 2 51.7	16 56 11.2	D	P. XVI. 36	

Hence the following Positions of the Comet.

1822.	Sidereal Time at Paramatta.	Mean Æ.	Mean Declin.	1822.	Sidereal Time at Paramatta.	Mean Æ.	Mean Declin.
	h m s	° ′ ″	° ′ ″		h m s	° ′ ″	° ′ ″
Sept. 23	20 15 46	244 30 8	3 10 22 N.	Oct. 27	22 6 51	241 23 20	23 8 57 S.
24	20 11 28	244 18 44	2 2 57	28	21 47 45	„ 21 58	23 39 17
26	20 8 52	243 55 51	0 6 39 S.	29	21 52 34	„ 21 0	24 10 40
27	21 37 46	243 45 45	1 13 3	30	22 2 51	„ 18 45	24 41 41
29	21 12 30	243 27 18	3 11 51	Nov. 2	22 39 4	„ 14 56	26 13 3
30	20 17 45	243 19 30	4 7 9	4	22 35 38	„ 12 43	27 11 15
Oct. 1	21 6 27	242 6 31	13 57 2	7	22 45 47	„ 10 12	28 36 41
16	21 21 39	241 49 49	16 39 36	8	22 54 2	„ 9 49	29 4 26
21	22 8 22	241 36 37	19 46 20	10	23 3 46	„ 7 51	29 59 56
22	21 29 26	241 34 0	20 20 18	11	23 5 46	„ 7 13	30 26 44
26	22 5 2.3	241 25 32	22 36 23				

From these Observations I have calculated the following Elements.

	Parabola.	Ellipsis.
Passage over Perihelion	1824, Oct. 24ᵈ.164853	24ᵈ.221201 Mean Time Paramatta.
Longitude of Perihelion	271° 40′ 32″	271° 36′ 18″.3
Longitude of Ascending Node	92 42 23	92 42 23
Inclination	52 40 41	52 40 41
Logarithm of Perihelion Distance	0.0592269.	
Logarithm of Eccentricity		9.9966440 $\varphi = 82° 53′ 11″$
Logarithm of half Parameter		0.3585731
Logarithm of half the Major Axis		2.1728525
Sidereal Revolution		663554.3 days = 1816.71 years.

C. Comet in the Lion, July 1824.

This Comet, which was not seen in Europe, was discovered and observed by me at Stargard in lat. 34° 10′ 11″ S. and long. 10ʰ 2ᵐ 41ˢ E. of Greenwich.

Original Observations made with a Circular Micrometer.

1824.	Mean Time at Stargard.	Stars.	Difference of Ascension in arcu.	Difference of Declination in arcu.
	h m s		° ′ ″	′ ″
July 15	7 15	A	+0 34 10	11 S.
		B	+0 32 28.5	11 N.
16	7 15 53	C	+0 14 21	7 46 N.
		D	+0 1 39	10 20 S.
17	6 52	E	+0 13 52.5	12 26.2 S.
		F	+0 3 37.5	18 S.
		G	−0 11 43.5	25 33.3 N.
18	7 31 48	H	+0 4 23.2	2 52.5 N.
		K	−0 8 26.2	14 9.7 S.
19	7 20 15.2	K	+1 0 49.5	47 43.5 N.
		L	−0 4 10.7	6 38.2 N.
		M	−0 32 1.5	27 41.5 S.
	7 4 35	N	−0 20 21	39 34.7 S.
		O	−0 30 34.5	54 23.2 S.
	7 9 4	P	−0 51 39	37 52 S.
	7 18 20	Q	+0 3 1.6	47 5 N.
	7 24 12	R	+0 18 10.5	28 55 N.
	7 30 0	S	−0 14 19	37 47 N.
20	6 53 0.4	T	+0 13 24.7	54 58.6 S.
		U	−0 19 40.5	16 12.1 S.
	7 13 35	V	+0 1 25	10 S.
		W	−0 15 27	23 5 N.
21	6 48 45.7	T	+1 46 22	5 12 N.
	7 3 36	U	+1 14 6	44 46.8 N.
		Z	+0 4 1	33 20.7 N.
22	6 51 4.4	a	+0 19 36.2	2 41 S.
		b	−0 32 13.5	14 32 S.
		c	−0 53 5.0	14 21.3 S.
July 23	6 23 40	c	+0 25 34.5	41 19 N.
	6 41 24	e	−0 2 0	20 36 S.
	6 27 2	f	−0 15 23.7	6 33.7 S.
24	7 39 19	g	+0 27 46.5	11 51 N.
		h	−0 52 40	21 11.5 N.
25	6 55 16	i	−0 58 58	14 36 N.
		k	−1 18 26	20 17 N.
27	6 46 33	l	+0 18 23.6	31 53.2 N.
	7 0 15	m	−0 42 16.6	
28	7 0 39.2	n	−0 24 11.3	19 15.3 S.
	6 56 6	o	+0 13 48	41 5.2 N.
	7 1 28	p	−0 42 12	1 30.6 S.
29	6 52 17	n	+0 28 45.6	17 30.4 N.
31	6 56 20	r	−0 17 14	12 33 S.
		s	−0 29 35	24 49 S.
		t	−0 46 28	29 3 N.
Aug. 1	6 53 48	u	+0 43 55	1 30.3 N.
		v	+0 15 2	7 59.4 N.
		w	+0 27 26.2	19 26 N.
5	7 4 27	x	+0 31 1.5	10 57 S.
		y	−2 28 9	34 50.2 S.
		z	−3 5 52	38 44.2 S.
		a	−3 9 9	42 56.2 S.
6	6 53 57	β	+1 4 15	15 16 N.
		γ	+0 40 33	31 2 S.

Remark.—On the 15th of July the Comet was only observed through the diaphragm of the telescope without the micrometer.

Mean Places of the Stars for the Time of Comparison.

Stars.	Mean Æ.	Mean Declin.	Stars.	Mean Æ.	Mean Declin.
	h m s	° ′ ″		h m s	° ′ ″
A	145 44 26	3 38 31 N.	f	160 41 11	12 17 22 N.
B 7 Sext.	145 47 14	3 16 6	h	162 37 48	12 38 44
C	148 23 34	4 30 49	i P. X. 231.		
D	148 37 39	4 48 55	m P. XI. 4.	165 37 49.3	15 21 10
G 19 Sext.	150 55 3	5 28 44	n θ Leonis	166 15 16.1	16 23 17
H Hist. Cel. 226			p	166 33 7.0	16 4 12
K 43 Leonis	153 27 30	7 25 53	r 333 Hist. Cel.	168 36 27	18 16 19
L Messier	154 53 29.5	8 8 10	s 333 Hist. Cel.	168 48 15	18 18 15
M Messier	154 59 14.5	8 42 45	t 81 Leonis	169 6 48	17 25 14
T ρ Leonis	155 53 29	10 12 26	u 332 Hist. Cel.	168 19 10	18 23 56
U 49 Leonis	156 27 22	9 33 18	v 333 Hist. Cel.		
Z 457 Mayer	157 37 34	9 45 15	w 333 Hist. Cel.		
a Hist. Cel.	158 47 28	11 17 45	x Hist. Cel.	171 4 32	20 39 5
b ibid.	159 38 8	11 22 3	y Hist. Cel.	174 3 22	20 52 6
c 53 Leonis			α 93 Leonis	174 43 54	21 11 37
e	160 28 41	12 30 40.3	γ Hist. Cel.	171 28 13	21 24 50

Mean Positions of the Comet.

1824.	Mean Time at Stargard.	Mean Æ.	Mean Declin.	1824.	Mean Time at Stargard.	Mean Æ.	Mean Declin.
	h m s	° ′ ″	° ′ ″ N.		h m s	° ′ ″	° ′ ″ N.
July 15	7 15	146 19 9	3 27	July 24	7 39 19	161 45 8	12 59 55 N.
16	7 15 53	148 38 36	4 38	25	6 55 16	162 51 7	13 51 25
17	6 52	150 43 19	5 54 17	27	7 0 15	164 55 33	15 21 11
18	7 31 48	152 42 21.2	7 5 45	28	7 0 39	165 51 6	16 3 28
19	7 20 15	154 28 52	8 14 40	29	6 52 17	166 44 2	16 40 47
20	6 53 0	156 7 28	9 17 12	31	6 56 20	168 19 36	17 53 55
21	7 3 36	157 41 11	10 18 10	Aug. 1	6 53 48	169 3 22	18 25 49
22	6 51 4	159 7 15	11 14 27	5	7 4 27	171 35 16	20 28 23
23	6 41 24	160 26 6	12 10 10	6	6 35 57	172 8 46	20 54 5

Parabolical Elements of this Comet.

Passage over the Perihelion . . . . . 1824, July 11^d.9313773

Longitude of the Perihelion . . . . . 260° 16′ 32″

Longitude of the Ascending Node 134 19 9

Inclination 54 34 19

Perihelion Distance 0.591263

Motion retrograde.

D. Comet in the Lion, July 1825.

This Comet, which had been seen before in Europe, was discovered by me on the 9th of July at Stargard, where I made the following observations with a circular micrometer.

1825.	Mean Time at Stargard.	Stars.	Difference of Right Ascension in arcu.	Difference of Declination.	Number of Obs.
	h m s		″	° ′ ″	
July 9	7 36 0	α	+16 0	39 56.2 S.	2
		β	− 1 51	31 57.0 N.	2
		γ	−13 47	12 32.2 N.	5
		Ano.	−37 9	3 8 N.	1
10	7 6 20	δ	+18 47	.....	7
	7 2 47	δ	.....	7 4 N.	5
	7 6 20	ε	−12 38	.....	7
	7 2 47	ε	.....	0 12 N.	5
	6 59 13	ε	−29 43.5	.....	4
	6 43 17	η	.....	17 19 N.	2
	6 43 17	ζ	−41 27	6 2 N.	2
11	6 21 33.5	π	−19 10.5	38 58 S.	1
	7 4 8	θ	−31 18	35 28 N.	5
	6 57 2	81 Ω	−48 54	0 39 N.	6

1825.	Mean Time at Stargard.	Stars.	Difference of Right Ascension in arcu.	Difference of Declination.	Number of Obs.
	h m s		″	° ′ ″	
July 12	7 8 14	ι	+0 3 7.5	0 11.9 N.	8
	6 53 1	θ	−0 20 48	21 37 S.	2
13	7 3 6	π	+1 11 37	25 4 N.	1
	7 10 18	κ	+0 12 35	19 49.4 N.	7
	7 42 4	λ	−0 7 49	43 38 N.	1
	7 11 44	μ	−0 8 25	28 33 N.	6
	7 29 39	ν	−0 10 5	40 58.5 N.	3
	7 3 6	ο	−0 21 18	27 38 N.	1
14	7 22	λ	+0 1 51	7 5 S.	1
		μ	−0 0 18	9 57 S.	1
15	7 7 42	ϱ	+0 13 52	28 23 N.	1
		σ	+0 8 49.5	10 39 N.	1
		τ	+0 1 7.5	3 27 S.	1

Mean Places of the Stars for the Time of Comparison.

Stars.	Mean Right Ascension.	Annual Variation.	Mean Declination.	Annual Variation.
	h m s	″	° ′ ″	″
α	7 39 36	47.51	20 2 13	19.51
β	7 58 33	47.37	18 49 30	19.54
γ	8 10 7	47.38	19 9 3	19.55
δ	7 49 1	47.49	18 6 0	19.59
ε	8 19 55	47.27	18 23 42	19.58
η	7 37 13	47.24	18 6 4	19.59
ζ	8 48 59	47.22	18 17 59	19.61
θ	8 49 36	47.20	16 50 32	19.61
81 Ω	9 7 34	47.27	17 24 56	19.68
ι	8 26 24	47.11	16 29 34	19.59
κ	8 26 40	47.04	15 16 51	19.60
λ	8 47 35	46.98	14 51 47	19.62
μ	8 47 54	47.00	15 7 36.7	19.62
ν	8 49 27	46.98	14 54 37.5	19.62
τ	8 59 16	46.89	13 58 10	19.65

τ is the last star, page 148 of the *Histoire Céleste*, where the last wire should have been 58″.5 in lieu of 38″.5.

Positions of the Comet.

1825.	Mean Time at Stargard.	Mean Æ.	Mean Declin.
	h m s	° ′ ″	° ′ ″
July 9	7 36	167 56 18	19 21 38 N.
10	6 56 52	168 7 34.5	18 23 24
11	6 57 1.5	168 18 32	17 25 47
12	7 5 11	168 29 23	16 29 35.5
13	7 16 6	168 39 21	15 36 14
14	7 22	168 49 17.5	14 44 41.2
15	7 7 42	169 0 23.5	13 54 43

Parabolical Elements of the same.

Passage over Perihel. . . 1825, May 30ᵈ.77265 Mean Time Stargard.
Longitude of Peribelion 273° 4′ 37″ from true Equinox, July 12.
Long. of Ascend. Node 20° 17′ 34″ from true Equinox, July 12.
Logarithm of Peribel. Distance 9.9552155.
Inclination ..... 58° 35′ 58″
Motion retrograde.

E. Great Comet of 1825.

Of this Comet I shall give only my observations during those times when its positions either became less favourable to European observers, or rendered it invisible to them. During the remainder of its appearance it was very generally observed, and with better instruments than I was provided with.

Original Observations with a Circular Micrometer.

1825.	Mean Time at Stargard.	Star's Name or Number.	Diff. of Right Asc. in Time.	Differ. of Declin.	No. of Obs.
	h m s		m s	′ ″	
Oct. 2	10 40 40	ν Eridani	+ 1 31.4	27 40.6 N.	8
		Sequens	− 29.3	7 29.3 N.	
3	9 57 58	a Anon.	+ 2 8.8	15 57 N.	3
	10 16 34	b ——	− 2 44.3	5 48.4 N.	6
	10 35 11	c ——	− 2 56.5	43 12.9 N.	3
5	8 40 15	g Anon.	− 3 13.3	31 7 N.	1
	8 55 48	f ——	− 2 13.8	4 26 N.	3
	8 57 5	i ——	− 4 24.4	20 33.9 N.	5
	9 3 35	τ Ceti	− 7 0.2	23 33.5 S.	2
	9 11 54	h Anon.	− 3 21.0	13 0.3 N.	3
	9 20 58	e ——	+ 27.3	26 37 N.	6
	9 53 54	d ——	+ 1 5.6	41 57 N.	1
14	8 11 49	74	− 23.58	47 5.6 S.	1
		75	− 2 51.2	41 32.8 S.	1
	8 19 36	73	.....	7 44.2 S.	2
	8 25 3	73	+ 32.95	.....	2
	8 27 23	72	.....	35 33 N.	1
	8 31 40	72	+ 3 36.85		
15	8 35 13.2	70	− 3 18.88	7 27.8 S.	1
	8 37 54	69	− 36.22	5 59.3 S.	1
16	8 14 46	Anon.	+ 1 31.15	16 24	
17	7 31 36	l	− 2 38.1	18 26.7 N.	2
	7 49 0	65	+ 48.9	13 4 S.	2
	7 49 0	k	− 1 38.1	19 31 N.	1
	8 6 25	64	+ 52.8	.....	1
	8 6 25	m	− 4 31.1	25 0 N.	1
18	15 33 35	58	+ 12.6	19 50 N.	3
	15 34 36	54	+ 4 35.7	34 55 N.	1
	15 48 43	56	+ 54.4	40 14 N.	1
	15 48 43	59	− 12.1	41 49 N.	1
19		n. 1920 C. A.	+12 35.7	16 55.2 S.	1
		o	+ 6 51.8	21 25 S.	2
	8 14 46	p p. 95 C. A.	+ 6 28.2	6 56 N.	1
		q	+ 5 19.9	25 48 S.	2
	8 39 12	o	+ 6 38.6		
		q	+ 5 11.0		
	15 57 8	r C. A. p. 85	+ 2 22.8	.....	1
	16 9 49	50	+ 1 30.0	31 24 N.	1
	16 15 49	51	+ 0 43.1	38 58 N.	1
20	7 26 24	s	− 2 42.6	20 S.	1
		t C. A. p. 85	.....	1 28.5 N.	1
	7 35 51	49	+ 3 4.4	51 19 S.	2
	7 44 12.9	50	− 6 37.9	10 48 S.	3
		51	− 7 16.6	3 21.5 S.	3
21	15 53 9.3	45	+ 3 38.5	15 27.2 S.	4
		46 , Phœ.	+ 3 20.9	19 56.5 S.	5

1825.	Mean Time at Stargard.	Star's Name or Number.	Diff. of Right Asc. in Time.	Differ. of Declin.	No. of Obs.
	h m s		m s	′ ″	
Oct. 22	16 17 46	44 115 Bo. Gr.	− 2 35.4	45 18 N.	1
23	7 46 12	40 100 Bo. Gr.	+ 2 21.8	18 28.6 N.	4
	15 27 10	40	− 1 25	5 1.3 N.	4
	15 54 30	39 , Gruis	.....	46 53 N.	1
25	7 52 34	35	+ 3 39.7	8 12.5 S.	1
		u C. A. pag. 83	− 1 9.9	9 41.4 S.	1
		36	− 2 27.7	7 38.6 S.	1
	12 21 37	v	+ 2 28.6	36 1 N.	4
	12 25 47	w	+ 35.0	29 45 N.	2
	12 50 11	35	+ 1 24.6	15 52 S.	6
26	7 44 0	32 1829 C. A.	+ 52.6	50 28 N.	6
27	7 38 37	30 52 Bo. Gr.	− 1 27.5	.....	1
		31 β Gruis	.....	47 35 N.	1
28	13 9 41	26	+ 2 23.1	23 54 S.	5
	13 9 41	27 π Gruis	+ 2 0.8	25 2.4 S.	5
	13 16 32	28	+ 1 40.5	19 45 N.	3
	14 6 53	x	+12 33.1	.....	1
	14 6 53	24 α Gruis	+16 56.8	35 14 N.	1
29	13 33 53	α Gruis	+ 8 6.8	27 26.7 N.	8
30	9 31 42.6	α Gruis	+ 56.9	23 31.6 N.	8
Nov. 13	8 50 7	22 ζ Indi	+ 2 25.6	41 43 N.	7
14	8 23 32	ζ Indi	− 59.1	50 37 N.	7
16	8 28 17	21	− 8.8	11 38.7 S.	3
	8 53 21.5	y	− 2 4.0	21 45 S.	1
20	8 43 45	19 , Indi	− 2 26.0	1 25.7 N.	5
	8 31 49	C. A. p. 83	− 4 21.2	8 44 S.	1
22	8 4 16	15	+ 4 39.1	18 45 N.	1
	8 14 49	16	− 4.4	31 25 N.	4
25	8 22 10	14 359 B. Sag.	+ 2 22.2	41 51 N.	2
	8 32 35.5	z	− 1 56.2	8 45.2 S.	4
30	8 29 12	10 P. XIX 416	+ 39.4	21 56 S.	1
Dec. 1	8 14 21	10	− 49.8	19 28 S.	4
3	8 41 23	Anon.	− 3 34.6	2 36 S.	1
9	8 49 38	4	− 50.03	43 11 N.	3
	9 0 34	3	+ 2 6.0	49 27 N.	2
	9 23 58	2 E Sagittarii	+ 7 7.3	21 8 S.	3
12	8 50 56	E Sagittarii	+ 4 25.7	5 13 S.	4
16	8 20 58	E Sagittarii	+ 1 16.8	11 49 N.	1
20	8 37 5	E Sagittarii	− 1 31.65	34 58 N.	5

A long succession of rainy weather interrupted the observations.

The numbers have reference to the stars, of which the places have been determined by my own observations; as in the following list the stars designated with alphabetic characters have not been observed by me.

Mean Places for January 1, 1827, of 86 Fixed Stars situated in the track of this Comet.

No. of Stars.	Mean Right Asc. January 1, 1827.	Annual Variation.	Mean S. P. D. Jan. 1, 1827.	Annual Variation.	Magnit.	No. of Stars.	Mean Right Asc. January 1, 1827.	Annual Variation.	Mean S. P. D. Jan. 1, 1827.	Annual Variation.	Magnit.
1	294 40 20	62.67	47 42 57	+ 8.23	7	44	349 53 10.4	49.47	44 33 7.7	+19.70	6
2	295 49 36	62.29	47 41 13.4	8.72	4.5	45	351 22 29.1	48.78	46 21 41.0	19.78	6
3	297 5 52	62.73	46 29 42.1	9.14	6	46	351 26 6.7	48.76	46 25 52	19.79	5
4	297 49 4.2	62.29	46 36	.....	6	47	353 10 58.8	48.14	46 46 31.2	19.87	7
5	297 55 0.1	.....	♭ Pavonis	.....	4	48	354 17 17.5	47.71	47 29 56.9	19.91	7
6	298 44 50.3	62.96	40 52	.....	7	49	355 40 3.5	47.26	48 12 55.6	19.95	6
7	299 20 32.1	62.98	45 36	.....	7	50	358 5 27.1	46.60	47 33 5.0	20.00	6
8	299 30 38.1	62.90	45 36 37.0	9.8	7	51	358 15 12.9	46.55	47 25 30.7	20.00	6
9	299 48 27.1	62.76	45 50 31.0	9.8	7	52	359 15 6.7	48.34	47 17 16.7	20.00	7
10	300 7 11.6	62.16	46 43 14.1	10.0	6.7	53	359 38 11.5	46.00	48 33 53.8	20.00	7
11	300 13 12.0	63.23	44 57	.....	7	54	0 37 50.6	45.69	48 39 49.8	20.00	7
12	301 35 36.3	62.01	46 37 9.3	10.5	7	55	0 43 37.19	45.76	53 44	.....	7
13	301 41 58.7	62.01	.....	.....	7	56	1 25 27.04	45.44	48 40	.....	7.8
14	301 43 12.6	62.93	44 56 49.7	10.53	6	57	1 33 40.52	45.60	52 53	.....	7.8
15	302 38 59.6	62.75			7	58	1 38 1.9	45.39	48 56 39.2	20.00	7
16	303 47 36.3	62.57	44 57	.....	7	59	1 41 47.9	45.39	48 35 14.5	20.00	7
17	304 51 22	62.35			7	60	1 44 48.5	45.53	53 44	.....	7
18	305 18 4.4	62.23	44 54	.....	7	61	2 24 0.2	45.25	52 36	.....	7.8
19	305 30 0.1	62.12	44 54 27.3	11.62	7	62	3 4 1.85	44.77	49 48 0.1	19.98	5.6
20	306 37 29.8	62.07	44 53 8.1	11.95	6	63	3 22 40.0	44.94	50 36	.....	7.8
21	307 35 57.9	62.02	44 30 23.7	12.2	6	64	5 36 15.3	44.32	51 25	.....	7
22	309 23 4.7	62.42	43 8 33.2	12.7	6	65	5 38 40.8	44.32	51 28	.....	8
23	311 1 3.2	61.12	44 46 30.7	13.12	7	66	9 34 31.3	43.39	52 59	.....	7
24	329 19 19.9	57.15	44 12 23	17.2	2	67	10 10 31.3	43.27	52 50	.....	7
25	330 30 23.4	57.60	40 5 59.9	17.42	7	68	11 0 9.7	43.17	54 55	.....	7
26	333 1 43.0	55.58	43 11 4.7	17.83	6	69	12 7 15.9	43.13	54 28	.....	7.8
27	333 7 4.1	55.53	43 12 20.4	17.85	6	70	12 47 54.6	42.74	54 25 24	19.51	7
28	333 11 33.2	55.76	42 27 44.3	17.85	6	71	13 16 56.9	42.65	56 53	.....	7.8
29	334 49 53	54.3	45 22 16	18.11	6	72	14 5 21.4	42.56	55 32 16	19.41	7
30	336 54 42.4	53.57	42 23 51.5	18.4	6	73	14 52 15.0	42.47	56 15 34	19.34	7
31	338 4 24.1	54.13	42 12 50.4	18.56	3	74	15 8 14.3	42.46	56 46	.....	8
32	338 51 23.2	53.77	42 32 55	18.66	6	75	15 45 10.4	42.35	56 49 37.5	19.26	7
33	339 6 37.64	53.78	42 9 15.4	18.69	7	76	16 18 47.7	42.31	57 11	.....	7
34	340 23 40.7	52.75	44 37	.....	7	77	16 23 38.1	42.31	57 53	.....	7
35	340 47 32.7	52.72	43 56 12.1	18.90	6	78	16 35 12.3	42.31	57 53	.....	7
36	342 19 11.4	52.22	43 53 11.5	19.07	6	79	18 29 5.0	39.31	43 56 55.0	18.98	7
37	342 47 58.4	52.04	.....	.....	7	80	20 10 19.1	41.79	59 12 5.3	18.78	7
38	343 8 17.15	51.95	43 46 9.9	19.15	7	81	20 24 52	41.74	59 12	.....	8
39	345 7 56.3	51.24	43 49 5.3	19.34	6	82	20 43 20.2	41.43	57 48	.....	7
40	346 44 58.6	50.56	44 34 13.3	19.48	6	83	20 47 45.2	41.43	57 48	.....	7
41	347 58 0.1	50.21	44 9 8.2	19.57	7	84	20 52 11.1	41.64	59 7 4	+18.76	7
42	348 33 33.4	49.74	45 55 40.0	+19.61	7	85	21 21 28.1	41.56	59 11	.....	7
43	349 41 45.4	49.53	44 38	.....	7	86	21 47 36.0	41.21	57 48	.....	7

Remark.—Where the South Polar Distance is not given to Seconds, it is merely estimated according to its distance from the horizontal wire of the Transit.

Positions of the Comet, deduced from the above Observations.

1825.	Mean Time at Stargard.	Mean Right Ascension.	Mean S. P. D.	1825.	Mean Time at Stargard.	Mean Right Ascension.	Mean S. P. D.
	h m s	° ′ ″	° ′ ″		h m s	° ′ ″	° ′ ″
Oct. 14	8 21 0	15 1 10.0	56 7 38	Oct. 28	13 20 21	333 35 31.4	42 47 0
15	8 36 34	11 57 21.1	54 17 33	29	13 33 53	331 19 54.5	42 39 29.4
17	7 57 42	5 49 18.4	51 15	30	9 31 42.6	329 32 26	42 35 34.3
18	15 38 48	1 40 26	49 15 51	Nov. 13	8 50 7	309 58 18.2	43 50 1.8
19	8 22 58	359 30 17	48 24 22	14	8 23 32	309 7 7.7	43 58 56
19	16 12 49	358 26 12	48 4 7	16	8 28 17	307 32 36	44 18 31.3
20	7 42 7	356 25 7.3	47 21 40	20	8 43 45	304 52 21.4	44 55 44
21	15 53 9	352 15 46	43 54 15	22	8 14 49	303 45 48	45 21
22	16 17 46	349 13 20.5	45 18 2.3	25	8 22 10	302 17 36.4	45 38 29.2
23	7 46 12	347 19 25	44 52 19	30	8 29 12	300 15 57	46 21 10
23	15 27 10	346 22 43	44 38 52	Dec. 1	8 14 21	299 53 39	46 23 38
25	7 52 34	341 41 20.1	43 46 24	9	9 4 43	297 35 36	47 19 28
25	12 50 11	341 7 39.5	43 39 58	12	8 50 56	296 54 52	47 35 49
26	7 44 0	339 3 29.0	43 23 1	16	8 20 58	296 7 40	47 52 51
27	7 38 37	336 31 46.5	43 0 3.3	20	8 37 5	295 25 34	48 16 0

Elements.

For the calculation of the elements I choose the Observations of the 2nd and 30th October and 20th December. From the apparent places of the fixed stars I deduce those of the Comet, and calculate thence its apparent latitudes and longitudes.

	Mean Time.	Comet's Apparent Long.	Comet's Apparent Lat.
	h m s	° ′ ″	° ′ ″
Oct. 2	10 40 39.6	36 51 50	24 13 58
30	9 31 42.6	313 48 52	32 35 33
Dec. 20	8 37 5	289 56 17	20 1 0

These I reduce to mean places for Nutation and Parallax found by approximated Distances of the Comet, and to the Times I apply the reduction for Aberration. I have then, proceeding according to Dr. Olber's method,

	Reduced M.T.	Mean places of the Comet.		Sun's Longitude and Distance.		Interval.
	h m s	° ′ ″	° ′ ″	° ′ ″		
Oct. 2	t 10 34 54.5	α 36 51 57	β 24 13 51	$\odot$ 189 0 47	R 9.9998749	I 27.951052
30	t′ 9 24 25.4	α' 313 48 59	β' 32 35 44	$\odot'$ 216 46 52	R′ 9.9965846	I′ 50.955588
Dec. 20	t″ 8 20 28.2	α'' 289 56 0	β'' 20 1 3	$\odot''$ 268 20 1	R″ 9.9927908	
		u 18° 52′ 35″	r 1.6231966	K 0.553954		
		u′ 38 21 36	r′ 1.3972681	K′ 1.084327		
		u″ 86 17 50	r″ 1.2534290			

Hence,	Ellipsis.	Parabola.
Passage over Perihel. 1825, Dec.	$11^d\ 4^h\ 45^m\ 8^s$	Dec. $10^d\ 16^h\ 36^m\ 23^s$ M. T. Stargard.
Longitude of Perihel.	318° 28′ 54″	319° 6′ 39″ From Mean Equinox, December 20, 1825.
Longitude of Node	215 44 58	215 44 58
Inclination	33 31 3	33 31 3
Logarithm of Perihelion Distance		0.0950103
Logarithm	9.9802984	Motion retrograde.
ϕ	72° 52′ 19″	
Logar. half Parameter	0.3866458	
Logar. half Major Axis	1.4438875	
Logar. half Minor Axis	0.9152666	
Logar. Sidereal Motion	1.3841754	
Logar. Sidereal Revolution	53509.3 Days.	

The elements of this Comet might have been found, without the assistance of the usual methods, in the following manner:—

The time of the Comet's passage through its node could be deduced from the observations, by finding through interpolation when its geocentric and consequently also its heliocentric latitude was =0. But the Comet was at that time near its opposition, so that a rough estimation of its distance ϱ from the earth was sufficient to find the longitude of the node by the formula

$$\text{tang } (\Omega - L) = \frac{\rho \sin (\alpha - L)}{R + \rho \cos (\alpha - L)}$$

where L is the heliocentric longitude of the earth, R its radius vector, and α the Comet's geocentric longitude; for as $\alpha - L$ is small near the opposition, ϱ can but little influence the angle of commutation.

We had also the opportunity of observing the Comet when the node was in opposition. For this time is a plane passing through Sun, Comet, and Earth, the plane of the Comet's orbit consequently $\frac{\text{tang } \beta'}{\sin (\alpha' - \Omega)} = \text{tang I.}$, β' being the Comet's geocentric latitude, and I the inclination of the orbit. Having thus obtained approximate values of Ω and I, the rest of the elements might be found as usual, and corrected by three Hypotheses. We had also the opportunity of observing the Comet in its opposition, when its heliocentric and geocentric longitudes were equal. Consequently, $\frac{\text{tang } (\alpha'' - \Omega)}{\cos I} = \text{tang } u'$, u' being the argument of latitude whence r'' is known, and the interval of time found according to LAMBERT's Theorem with r'', r and u', if this interval does

not agree with the observation, the operation must be repeated with a new hypothesis of ϱ.

The opportunity of observing a comet whilst its node is in opposition presents itself often, offering a means of ascertaining the inclination with the more preciseness the greater $\alpha - \mathfrak{S}$ is, as the sinus thereof suffers then but little alteration by an error in the longitude of the node, which is all that is assumed as given.

The two next Comets were discovered and observed by me at Paramatta.

F. Comet in Orion, Sept. 1826.

Original Comparisons of the Comet with fixed Stars, made with a Wire Micrometer.

1826.	Sidereal Time at Paramatta.	Difference of A in Time.	Comet N. or S. of Star.
	h m s	m s	′ ″
Sept. 4	2 50	b −0 9	
	3 28 21	a +1 32.46	11 0 N.
5	1 15	d in parallel with Comet	
	2 27 15	c + 13.06	
		d − 10.104	
	2 50 6	c + 19.48	19 58 S.
6	1 54 54	f	19 2 S.
	2 12 36	e − 10.8	2 S.
		f −1 33.5	
	2 51 2.5	g −5 49	10 38 S.
7	2 56 17	h − 50.45	1 16.6 N.
	3 1 8	h	1 30.2 N.
	3 5 0	i −1 48.1	
	3 32 48	k −4 12.2	
8	2 16 30	l + 8.87	10 50 S.
		m −1 11.0	
	2 22 0.5	n −1 21.0	
		o −2 44	
		p −3 37.3	
	2 39 30	o	16 20 S.
		p	4 10 N.
9	2 44 47	q − 11.3	1 49.7 S.
	3 19	q in centre of Comet.	
11	3 51 18	r − 22.84	22 31.5 S.
	3 55 23	s −1 58	5 17 S.
Sept. 12	2 50 50	t −5 11.74	
		u −5 53.4	7 47 N.
14	2 23 41	v +1 56.2	21 17.5 N.
		x +1 23.4	
	3 54 33	z − 27.0	22 48 S.
15	2 40	α +5 4	
		β +3 18	
	3 28 36	γ −2 6.6	17 33 N.
20	3 46 50	η −1 26.54	4 51.7 N.
	3 48 3	ε −1 47.5	
		ζ −2 24	
	4 10 40	δ +2 5	
21	3 47 59	ι −2 59.1	
	3 54 49	θ − 30.06	2 47.3 N.
	4 2 17	ι	5 24 N.
22	4 24 51	κ − 7.02	10 38 S.
23	4 41 55	λ +2 45.3	11 43 N.
		μ +2 31.8	44 N.
		ν −1 15.57	
24	4 14 46	ο +2 33.5	12 16 S.
		π +1 41.9	
		ρ − 58.5	
	4 41 48.5	ρ − 50.5	1 35 S.

1826.	Sidereal Time at Paramatta.	Difference of Æ in Time.	Comet N. or S. of Star.
	h m s	m s	′ ″
Sept. 25	5 20	σ −1 8.5	8 41.5 S.
26	4 38 29	τ −1 45.7	7 36.4 N.
29	4 40 41	φ +1 9.7	2 6.7 N.
		ψ − 6.5	
30	4 56 56	ω − 28.7	28 58 S.
		A −2 58.7	7 27 S.
	5 21 36	ω	28 10 S.
Oct. 1	4 56 20	B +1 3.7	15 2 N.
	5 5 29	C + 29.1	4 45.2 N.

1826.	Sidereal Time at Paramatta.	Difference of Æ in Time.	Comet N. or S. of Star.
	h m s	m s	′ ″
Oct. 3	5 15 41	D −2 31.2	
		E −3 25.53	1 9 N.
4	5 15	G	15 42.3 N.
	5 26 33	G −1 50.5	
	5 32 20	F +1 13.25	15 45.5 N.
5	5 23 7	K − 12.5	21 48 S.
	5 30 13	I + 43	1 S.
	5 35 17	H +4 21 in parallel.	

Mean Places of the fixed Stars for the Time of Comparison.

Stars.	Mean Æ.	Ann. Var.	Mean Declination.	Ann. Var.
	° ′ ″	″	° ′ ″	″
a	83 50 47	42.75	9 1 18.5	− 2.1
b	84 12 54	....	9 1	
c	85 45 4	43.25	7 34 9	− 1.48
e	87 30 2	....	6 53 39	
f	87 50 42	43.52	6 36 54	− 0.35
g	88 57 6	43.55	6 42 23	
h	89 23 23	43.91	5 52 16	− 0.3
l	90 47 35	44.28	4 37 53	+ 0.29
o	91 30 56.5	44.32	4 31 32	
p	91 43 58	....	4 51 44	
q	92 37 0	44.62	3 40 53	+ 0.79
r	96 12 41	45.52	1 5 34	+ 2.09
t	99 4 17			
u	99 14 55	55.62	0 32 21	+ 3.08
v	100 46 30	46.41	1 27 16	− 3.64
x	100 54 23	46.41	1 27 46	− 3.70
z	101 29 9	46.68	2 15 36	− 3.9
γ	103 37 53	....	2 41 19	

Stars.	Mean Æ.	Ann. Var.	Mean Declination.	Ann. Var.
	° ′ ″	″	° ′ ″	″
∂	111 30 57	....	7 57 23	
η	112 21 49	....	8 21 32	
ι	113 53 56	48.97	9 25 54	8.06
θ	114 31 37	48.94	9 23 40	8.24
λ	116 44 48	49.51	11 24 48	8.93
μ	116 48 28	49.59	11 35 4	8.97
ο	118 28 13	49.88	12 39 45	9.47
π	118 41 59			
ρ	119 20 46	49.78	12 26 33	9.77
σ	121 10 32	50.06	13 34 1	10.30
τ	123 3 28	50.20	14 10 13	10.90
φ	127 28 23	50.73	16 45 4	12.11
ω	129 34 18	50.97	18 1 44	12.68
B	130 51 23	51.04	18 1 5	13.04
C	131 0 48	51.00	18 11 41	13.11
D	135 2 47			
E	135 16 22	50.97	19 35 24	14.17
K	137 40 6	51.17	21 9 23	14.75

Positions of the Comet.

1826.	Sidereal Time at Paramatta.	Mean Æ.	Mean Declin.
	h m s	° ′ ″	° ′ ″
Sept. 4	2 50	84 10 26	
	3 28 21	84 13 54	8 50 19 S.
5	2 50 6	85 49 56	7 54 7
6	2 31 49	87 28 36	6 54 8
7	2 56 17	89 10 46	5 50 59
8	2 16 30	90 49 48	4 48 45
9	3 1 56	92 33 35	3 41 48
11	3 51 18	96 6 59	1 28 5
12	2 50 50	97 46 27.5	0 24 34
14	3 9 5	101 18 55	1 50 41 N.
15	3 28 36	103 6 14	2 58 52

1826.	Sidereal Time at Paramatta.	Mean Æ.	Mean Declin.
	h m s	° ′ ″	° ′ ″
Sept. 20	3 46 50	112 0 11	8 26 25 N.
21	3 54 49	113 46 37.5	9 28 42
23	4 41 55	117 26 19	11 36 17
24	4 28 17	119 7 26	12 27 49
25	5 20	120 53 25	13 25 20
26	4 38 29	122 37 3	14 17 49
29	4 40 41	127 45 48	16 47 11
30	4 56 56	129 27 7.5	17 32 46
Oct. 1	5 5 29	131 8 5	18 16 26
3	5 15 41	134 25 1	19 36 33
5	5 23 7	137 36 58	20 47 35

Parabolical Elements.

Passage over the Perihelion . . 1826, Oct. 9d.20553, Mean Time Paramatta.

Longitude from Mean Equin. Jan. 1, 1827, { Perihelion . . . . . 57° 30′ 15″ / Ascending Node . 44 10 34

Logarithm of Perihelion Distance . 9.9316004

Inclination . . . . . 25° 46′ 0″

Motion direct.

G. Re-appearance of the Comet of Encke in 1828.

Comparisons with principal stars, that but rarely chanced to be sufficiently near its track to avoid inaccuracies arising from the position of the wires or inequalities of the micrometer screws, would have been of little service for a comet, whereof the positions were already better known from the *Ephemeris* of Professor Encke. I have therefore confined my observations to stars, however small, to which it nearest approached, as their places may be determined at any time hereafter, being sufficiently known from the place of the comet itself to identify the stars in the meridian.

Original Observations of the Comet of Encke, made at Paramatta.

1828.

Nov. 2.—At 1h 11m 42s Sidereal Time, the Comet followed 56 Pegasi in 55s in Time, and was 6′ North thereof in arc.

Nov. 3.—At 23h 34m 41s Sidereal Time, the Comet preceded 56 Pegasi 3m 18s, being South of that Star. The Comet covered at the same time a Star (a) of the 10th magnitude, which was about 3′ North of two Stars (b and c) of the 9th magnitude situated contiguous to one another.

Nov. 5.—At 23h 1m 40s Sidereal Time, the Comet preceded a Star (d) 43s, whereof it was 4′ North. The Star is contained in the *Histoire Céleste*, its place being about in ☌ 22h 46m 24s, Declin. 23° 29′.

Nov. 7.—At 23h 19m 6s Sidereal Time, the Comet preceded λ Pegasi 2m 5s.5, and was 0′ 23″ North thereof. At 0h 47m Sidereal Time, the Comet preceded the same Star 2m 19s, and was 3′ 23″ North thereof. The latter observations are somewhat uncertain.

Nov. 10.—At 0h 14m 33s Sidereal Time, the Comet was in the same Hour-circle, and 15″ direct North of a Star (e) of the 9th magnitude. This Star had the same ☌ with, and was 3′ 30″ North of, the second of two contiguous Stars (f and g) of the 10th magnitude, whereof the difference of ☌ is 12s in Time.

1828.

Nov. 12.—At $0^h\ 29^m\ 27^s$ Sidereal Time, the Comet preceded a Star (h) $23^s.4$, and was at $0^h\ 50^m$ in the parallel of the Star. This Star is contained in *Hist. Cél.*, page 32, without any magnitude assigned to it, but it is of the 6th magnitude. The same Star precedes another of the 7th magnitude by 18^s, and precedes 33 Pegasi by $2^m\ 7^s$.

Nov. 13.—At $23^h\ 44^m\ 31^s$ Sidereal Time, the Comet followed a Star (i) in $18^s.7$, and preceded another Star (k) $22^s.5$, and was $5'\ 30''$ South of k. The Star (i) precedes 33 Pegasi $7^m\ 20^s$, and is $2'\ 4''$ South of k.

Nov. 14.—At $23^h\ 37^m\ 30^s$ Sidereal Time, the Comet followed a Star (l) in $1^m\ 16^s$, and was $13'\ 4''$ North thereof. The Star is of the 7.8 magnitude, and in the middle of two Stars of the 9th and 10th magnitude, all three forming a straight line in an angle of about 16° with the parallel of Declination.

At $0^h\ 55^m\ 30^s$ S. T. the Comet preceded { the Star (m) $1^m\ 38^s$, being $9'\ 28''$ S. thereof. / the Star (n) $1\ \ 59$, being $13\ \ 17$ S. thereof.

At $1^h\ 18^m$ S. T. the Comet preceded { the Stars (m) and (n) $1^m\ 41^s$. / the Star (o) $5\ \ 47$. / the Star (p) $6\ \ 42$.

o is of the 7th, and p of the 6th magnitude: p is to be found in *Hist. Cél.*, page 32, and is in about $22^h\ 10^m\ 34^s$ ℞ and 19° 7′ Declination.

Nov. 15.—At $23^h\ 39^m\ 28^s$ Sidereal Time, the Comet preceded 120 Pegasi Bode by $11^s.3$; and at $0^h\ 55^m$ Sidereal Time, it preceded the same Star $15^s.67$, and was $2'\ 11''$ North thereof. The observations of this Comet, which was very faint as yet, were now interrupted by the Moon, which passed in its neighbourhood.

Nov. 19.—At $0^h\ 10^m\ 24^s$ Sidereal Time, the Comet followed 13 Pegasi in $1^m\ 11^s$, being $2'\ 53''$ South thereof.

Nov. 23.—At $0^h\ 39^m\ 23^s$ Sidereal Time, the Comet preceded 34 Pegasi Bode by $59^s.33$. At $0^h\ 49^m\ 20^s$ the Comet preceded the same Star $1^m\ 2^s$, being $9'\ 47''$ South thereof.

Nov. 25.—At $0^h\ 48^m\ 5^s$ Sidereal Time, the Comet followed a Star (q) of the 7th magnitude in $38^s.12$. At $1^h\ 0^m\ 21^s$ it followed the same Star in $37^s.0$, and was $3'\ 38''$ North thereof.

Nov. 26.—At $1^h\ 45^m\ 19^s$ Sidereal Time, the Comet followed the Star { r in $3^m\ 22^s.7$ / s in 2 53 .7 / t in 0 45 .7 } and preceded { u $1^m\ 35^s.3$. / w 1 52 .8.

At the same time the Comet was $10'\ 56''$ N. of r, and at $1^h\ 50^m$ it was $14'\ 34''$ N. of t.

r, s, and t, are to be found in *Hist. Cél.*, page 106; by the middle wires, { r is $21^h\ 10^m\ 5^s.5$. / s is 21 10 24 .5. / t is 21 12 42 .5.

Nov. 27.—At $1^h\ 9^m\ 0^s$ Sidereal Time, the Comet preceded a star (x) $22^s.95$, and at $1^h\ 20^m\ 30^s$ Sidereal Time was $23'\ 51''$ South thereof.

1828.

Nov. 28.—At $1^h\ 4^m\ 18^s$ the Comet followed a Star (γ) in $1^s.8$, being $30'\ 10''$ North thereof.

The place of this Star according to *Hist. Cél.* is { R $21^h\ 10^m\ 22^s.5$. Decl. $10°\ 51'\ 31''$.

At $1^h\ 16^m$ the Comet preceded a star (ε) 42^s, and another star (α) 56^s; and was South of α, $22'\ 15''$.

Dec. 5.—At $1^h\ 1^m\ 0^s$ the Comet followed a Star (β) in $1^m\ 2^s$, and was $5'\ 26''$ North thereof.

At $1^h\ 31^m\ 42^s$, the Comet preceded 14 Delphini $28^s.12$, and was $13'\ 50''$ South thereof.

Fixed Stars.

Determination of the Right Ascensions of some of the principal Stars of the Southern Hemisphere, by absolute, and equal Altitudes.

1. Absolute Altitudes.

The weakness of the axis of the transit in Paramatta rendered it impossible for its optical axis to move in one and the same plane in passing from the north to the south of the zenith; so that I could not place implicit confidence in the right ascensions of the southern stars deduced from the northern by means of this instrument. I was therefore desirous to establish the right ascensions of some of the principal southern circumpolar stars, independently of the transit, by methods not subject to any constant error, and I resorted first to repetitions with Reichenbach's circle for observing the hour angles of these stars when near their greatest azimuth circle, corresponding to times of the sidereal clock, whereof the error was ascertained on the same days from equal altitudes of the Sun, Sirius, and other known stars. Not to lose the time devoted at night to the transit and mural circle, I made these observations in the day-time, having constructed for that purpose a table of azimuths and altitudes for the star from 5 to 5 minutes, which enabled me to find the star at any time for the left observation; and as the table contained also the double zenith distances, I had but to advance the nonius of the small circle by that quantity, in order to have the star again in the field after half a revolution in azimuth. Thus I could continue the repetitions to any extent with greater ease and accuracy in the day-time than at night. The observations were made as much as circumstances would admit east as well as west of the meridian, in order to let the errors of the instrument compensate each other. The observations were chiefly made at the time when the star's azimuth was a maximum, and

consequently stationary; the change of altitude was then proportional to the change of time, and the calculated hour-angle did not require the troublesome reduction of the middle of times to the middle of altitudes.

Though it cannot be expected that absolute altitudes will give the right ascensions with the same consistency amongst themselves as observations with a transit instrument, the mean of a great number of them derived from observations made on both sides of the meridian is more likely to be free from any constant errors to which the transit instrument may be subject.

Canopus.

1826.	Sidereal Time.	Culmination by Clock deduced from the Hour-angle.	Error of Clock.	Aberr. and Nutat. in arc.	Precess. to 1827.	Mean Right Ascension Jan. 1, 1827, in Degrees.
	h m	h m s	s	″	″	° ′ ″
June 27	10 30	6 19 58.6	+6.22	+26.51	+10.20	95 1 49.01
28	.....	„ 19 57.1	5.94	26.49	10.19	„ „ 22.90
30	2 7	„ 19 58.8	6.00	26.44	9.91	„ „ 48.35
July 5	2	„ 19 59.73	3.53	26.18	9.58	„ „ 24.66
6	2	„ 20 0.87	3.08	26.13	9.52	„ „ 59.25
7	2	„ „ 1.33	2.40	26.00	9.46	„ „ 34.41
8	2	„ „ 1.73	2.37	25.89	9.39	„ „ 36.78
9	2	„ „ 2.27	1.84	25.79	9.32	„ „ 36.76
10	10 30	„ „ 3.40	+1.48	25.60	9.22	„ „ 48.02
12	2 30	„ „ 4.76	−0.57	25.41	9.12	„ „ 37.38
13	10 25	„ „ 5.8	0.59	25.25	9.02	„ „ 52.42
13	2 49	„ „ 5.42	0.97	25.25	9.02	„ „ 40.98
14	10 22	„ „ 6.89	1.33	25.10	8.92	„ „ 37.42
14	2 54	„ „ 6.17	1.67	25.00	8.90	„ „ 41.40
15	10 16	„ „ 4.88	1.44	24.93	8.85	„ „ 25.38
15	2 56	„ „ 6.37	1.73	24.89	8.85	„ „ 43.34
16	10 24	„ „ 6.6	2.06	24.77	8.78	„ „ 41.65
17	10 21	„ „ 6.32	2.88	24.58	8.725	„ „ 24.90
17	2 57	„ „ 7.4	3.14	24.58	8.65	„ „ 37.13
18	10 32	„ „ 8.04	3.20	24.39	8.65	„ „ 45.64
19	10	„ „ 8.1	−3.7	+24.19	+ 8.59	„ „ 38.78

1826.	Sidereal Time.	Culmination by Clock deduced from the Hour-angle.	Error of Clock.	Aberr. and Nutat. in arc.	Precess. to 1827.	Mean Right Ascension Jan. 1, 1827, in Degrees.
	h m	h m s	s	″	″	° ′ ″
July 25	10 33	6 20 5.79	−0.8	+22.82	+8.33	95 1 45.90
28	10 29	„ „ 6.05	0.24	21.97	8.08	„ „ 57.20
30	2 55	„ „ 4.09	0.4	21.12	7.98	„ „ 41.67
31	10 33	„ „ 6.05	0.4	20.99	7.83	„ „ 53.75
Aug. 2	10 28	„ „ 5.77	−0.35	20.87	7.73	„ „ 49.90
5	10 30	„ „ 2.17	+0.08	18.60	7.53	
11	10 33	„ „ 3.89	1.68	16.33	7.34	„ „ 47.17
12	10 32	„ „ 3.19	2.47	16.46	7.24	„ „ 48.60
12	2 31	.....	.....	16.50	7.24	„ „ 36.64
13	9 51	„ „ 2.56	+2.9	16.60	7.14	„ „ 45.64
13	10 27	„ „ 7.56	−2.4	13.66	6.84	„ „ 37.79
26	9 59	„ „ 10.9	5.4	10.91	6.54	„ „ 39.95
28	10 12	„ „ 12.26	6.28	9.44	6.40	„ „ 45.24
Sept. 1	9 44	„ „ 13.18	7.18	7.97	6.25	„ „ 44.22
1	10 1	„ „ 13.10	7.18	7.97	6.25	„ „ 43.02
2	9 47	„ „ 13.57	7.14	7.47	6.20	„ „ 50.12
3	9 51	„ „ 12.81	7.08	6.97	6.15	„ „ 39.82
12	9 48	„ „ 10.14	4.33	2.20	5.85	„ „ 35.20
1827.						
May 9	2 23	„ „ 1.55	+4.63	16.87	6.99	„ „ 42.58
9	2 43	„ „ 1.30	+4.62	+16.87	+6.99	„ „ 38.68

Mean	95 1 42.09
Annual Variation	19.81
Mean Æ, January 1, 1828...	95 2 1.90

α Eridani.

1826.	Sidereal Time.	Culmination by Clock by the Hour-angle.	Error of Clock.	Aberr. and Nutat. in arc.	Precess. to 1827.	Mean Right Ascension, Jan. 1, 1827, in Degrees.
	h m	h m s	s	″	″	° ′ ″
July 30	4 48	1 31 16.77	−0.59	−10.44	+13.37	22 49 5.93
31	4 50	„ „ 16.72	−0.31	11.09	13.17	„ „ 8.23
Aug. 1	4 44	„ „ 16.88	−0.20	11.64	13.09	„ „ 11.65
3	5 30	„ „ 15.78	−0.06	12.76	13.04	„ 48 56.08
4	5 17	„ „ 15.59	+0.10	13.31	12.94	„ „ 54.98
10	5 36	„ „ 14.40	+1.34	16.60	12.27	„ „ 51.87
11	4 52	„ „ 13.83	+2.49	17.15	12.27	„ „ 59.95
19	5 21	„ „ 18.1	−2.07	21.25	11.60	„ „ 51.60
20	5 30	„ „ 19.07	−2.70	21.80	11.53	„ „ 55.28
25	5 17	„ „ 22.19	−5.69	24.13	11.03	„ „ 54.40
Sept. 2	5 27	„ „ 24.20	−7.09	27.63	10.55	„ „ 59.52
4	5 19	„ „ 23.92	−6.82	28.27	10.35	„ „ 58.58
5	5 29	„ „ 23.37	−5.95	28.82	10.25	„ 49 2.73
6	5 25	„ „ 23.32	−5.75	29.37	10.15	„ „ 4.30
13	5 32	1 31 21.00	−3.21	−31.68	+ 9.89	„ „ 4.86
		Mean				22 48 59.33
		Annual Variation				33.43
		Mean ℛ of α Eridani, January 1, 1828...				22 49 32.76

2 α Centauri.

1826.	Sidereal Time.	Culmination by Clock deduced from the Hour-angle.	Error of Clock.	Aberr. and Nutat. in arc.	Precess. to 1827.	Mean Right Ascension, Jan. 1, 1827, in Degrees.
	h m	h m s	s	″	″	° ′ ″
July 10	10 7	14 27 55.46	+1.48	−41.47	30.76	216 59 3.39
14	9 59	„ „ 57.08	−1.36	39.06	30.09	„ 58 46.83
15	9 59	„ „ 57.72	−1.44	38.35	29.86	„ 58 55.71
16	9 57	„ „ 58.29	−2.09	37.84	29.64	„ 58 54.80
17	9 52	„ „ 59.10	−2.88	37.23	29.42	„ 58 55.49
18	10 5	„ „ 58.98	−3.08	36.60	29.08	„ 58 50.48
19	10 0	„ „ 59.50	−3.45	35.98	28.75	„ 58 53.52
25	9 43	„ „ 56.70	−1.28	32.19	27.74	„ 58 47.61
28	9 44	„ „ 57.32	−0.35	30.28	27.19	„ 59 11.46
30	10 11	„ „ 56.39	−0.31	28.99	26.74	„ 58 58.95
31	9 55	„ „ 57.30	−0.41	28.35	26.52	„ 59 11.52
Aug. 2	10 0	„ „ 57.14	−0.54	27.07	26.27	„ 59 8.2
4	9 49	„ „ 55.53	−0.08	25.79	25.87	„ 59 6.83
5	10 2	„ „ 56.03	+0.08	25.15	25.67	„ 59 2.17
12	9 47	„ „ 53.77	+2.42	20.67	24.40	„ 59 6.58
12	10 4	„ „ 53.75	+2.43	20.67	24.40	„ 59 6.43
28	9 42	„ 28 1.47	−6.28	10.86	21.72	„ 58 58.71
28	9 53	„ 28 1.25	−6.28	10.86	21.72	„ 58 55.41
Sept. 2	10 11	„ 28 2.23	−7.15	− 7.98	21.06	„ 59 0.78
		Mean				216 58 59.73
		Annual Variation				1 6.856
		Mean ℛ of 2 α Centauri, January 1, 1828 ...				217 0 6.586

2. Equal Altitudes.

The object of these observations was the determination of the right ascensions of some of the principal stars of the southern hemisphere that are circumpolar at Paramatta, by a direct comparison with the sun, independent of the transit and of the solar tables. This comparison was made by deducing the superior and inferior culminations of the stars from a series of equal altitudes, which was kept on without interruption for the space of a month about the time of the Equinox; and by deducing the true noon and midnight on the same days from equal altitudes of the sun, whereof the evening set was again connected with the morning set. This gave the difference of right ascensions between the sun and stars. The distance of the sun from the Equinox is finally derived from the observed declination of the sun on those days.

For the observations of the equal altitudes of the stars I made use of the repeating circle. The level was during the whole month kept invariably in the same position towards the division of the great circle, which by means of the level was maintained in the same position to the horizon. Thus the equal altitudes of any number of stars could be observed together with their superior and inferior culminations. In order to derive some benefit from one set of altitudes in case that clouds should prevent the corresponding one, I had determined the point of the division answering to the zenith in the manner described in page 7; so that each observation could be reduced to the culmination by means of the hour-angle; and in that view I had also constructed a table of the hour-angles for every five minutes of altitude, corrected for the refraction answering to the mean height of the barometer and thermometer during that period, separately for the morning and evening set.

These observations having been also chiefly made in the day-time, it was expedient to be provided with a table for finding the stars more readily.

Suppose φ the colatitude, δ the polar distance, τ and t the hour-angles, x and ζ zenith distances, Z the meridional zenith distance, D the difference of altitudes, A difference of azimuths, $x = \frac{1}{2}(\tau - t)$ half difference of hour-angles, and N an auxiliary angle: then is

$$\cot \varphi \tan \delta = \cos t,$$
$$\cos \varphi \sec \delta = \cos \zeta,$$
$$\cos \varphi \sin \delta = \sin \text{azimuth};$$

$$\text{and } \sin x \sin \delta = \sin \tfrac{1}{2} \text{D}, \qquad \sin \text{A} = \frac{2 \sin \delta \sin x \sin \text{N}}{\sin (\zeta + \text{D})}$$

$$\text{where } \tan \text{N} = \cos \delta \tan x.$$

With D and A by simple addition or subtraction a table of altitudes and azimuths may be constructed for every five minutes of the hour-angle.

Stars observed on one side of the meridian become often visible on the other side, only at a greater distance from it; so that it is sometimes necessary to combine unequal altitudes, which is not difficult with stars, if the same differences of altitudes are observed on each side.

The formula $\sin x = \frac{\sin \frac{1}{2} \text{D}}{\sin \varphi \text{ in azimuth}}$ serves to reduce these observations. x is the quantity to be applied to the middle time to reduce it to the time of culmi-

nation. D is here the difference between the eastern and western altitudes combined together; so that $\frac{\sin \frac{1}{2} D}{\sin \phi}$ is a constant factor: and a table of the reductions x may be constructed with the sole entry of the half interval, whereof the azimuth is a function, and given opposite to it in the table of azimuths and altitudes; for hour-angle and half interval are here equivalent. A formula expressed in terms of the half interval only, would probably be rather complicate.

This formula results from $\sin x = \frac{\sin \frac{1}{2}(\zeta - z) \sin \frac{1}{2}(\zeta + z)}{\sin \frac{1}{2}(\tau + t) \sin \phi \sin \delta}$, which serves in general to find the change in time corresponding to that of altitude, and reciprocally; if we suppose $\tau = 0$, this formula becomes the well-known one for finding the hour-angle.

$$\sin \tfrac{1}{2} t = \sqrt{\frac{\sin \frac{1}{2}(Z + z) \sin \frac{1}{2}(Z - z)}{\sin \phi \sin \delta}}$$

used when no corresponding altitudes can be had. But by combined altitudes the effects of any unknown error of the instrument are avoided. $2x$ applied to the times on either side of the meridian reduces the combined altitudes to equal altitudes.

Method of finding the Sun's Distance from the Equinox.

Suppose α and α' the sun's distance upon the equator from the equinox corresponding to the declinations δ and δ' observed with the mural circle, then by the known formula for finding the equinoctial point,

$$\tan \tfrac{1}{2}(\alpha - \alpha') = \tan \tfrac{1}{2}(\alpha + \alpha') \frac{\sin (\delta - \delta')}{\sin (\delta + \delta')}$$

is the obliquity of the ecliptic eliminated. But this is no advantage, as the obliquity is better known than the declination. Suppose x the increase of $\mathcal{R}$ corresponding to an increase a of declination, and x' the increase of $\mathcal{R}$ corresponding to an increase a' of the obliquity ω, then is

$$x = \frac{a \cot \omega}{\cos \mathcal{R}} \text{ and } x' = \frac{a' \tan \mathcal{R}}{\tan \omega} \text{ if the } \mathcal{R} \text{ is not too near } 90° \text{ or } 270°.*$$

---

* Demonstration:

$$\tan (\delta + a) \cot \omega = \sin (\alpha + x)$$

$$\cot \omega \left\{ \frac{\tan \delta + \tan a}{1 + \tan \delta . \tan a} \right\} = \sin \alpha \cos x + \cos \alpha \sin x$$

but $\tan \delta \tan a = o$ and $\cos x = 1$

therefore $\cot \omega \tan \delta + \cot \omega \tan a = \sin \alpha + \cos \alpha \sin x$

subtract $\cot \omega \tan \delta \ldots\ldots\ldots = \sin \alpha$

remains $\cot \omega \tan a = \cos \alpha \sin x$.

The other formula can be demonstrated in a similar manner.

Hence the following Tables may be constructed:

Argument Right Ascension	0°	2°	3°	4°	5°	6°	7°	8°	9°	10°
Cor. of α for 1″ increase of Declination....	2″.304	2″.305	2″.307	2″.308	2″.313	2″.317	2″.322	2″.328	2″.332	2″.340

Argument Right Ascension	1°	2°	3°	4°	5°	6°	7°	8°	9°	10°
Cor. of α for 1″ increase of Obliquity.....	0″.04	0″.08	0″.101	0″.161	0″.202	0″.242	0″.282	0″.324	0″.365	0″.406

So that considering how small the influence upon the right ascension is of an error that could possibly exist in an element, such as the obliquity, long established by innumerable observations, whilst every declination stands by itself with all the errors to which one single observation is liable, we need not hesitate to adopt the obliquity as known, and by using the formula $2 \sin \frac{1}{2}(\alpha - \alpha') = \frac{\sin(\delta - \delta') \cot \omega}{\cos \delta \,.\, \cos \delta' \cos \frac{1}{2}(\alpha + \alpha')}$ we shall have the advantage of introducing one well-known part ω in the room of the uncertain divisor $\sin(\delta + \delta')$ wherein the errors of observation are doubled. $\cos \delta \,.\, \cos \delta'$ is nearly $= 1$. The errors of so small an angle as δ is near the equinox, utterly disappear in the cosine; and $\alpha \pm \alpha'$ is sufficiently well known, as we shall see presently: but I have preferred the following method.

Besides δ and ω, whereby α is already determined according to the formula $\sin \alpha = \tan \delta \cot \omega$, there is also given $\alpha + \alpha'$; and as this can be ascertained with great precision, I have made use thereof in the following manner to correct the former.

By deducing the errors of the clock, from a comparison of the culminations of the principal fixed stars near the equator with their known right ascensions, and applying these errors to the transits of the sun, we obtain the sun's right ascensions at the time of his passing the middle wire, as near as the places of the fixed stars can be depended on; but the differences of these right ascensions $\alpha \pm \alpha'$, which is all that we require, are correct to all intents, and independent of a small deviation of the transit, as well as any constant error in the places of the fixed stars. At the same time, for confirmation, $\alpha \pm \alpha'$ may be deduced from the Nautical Almanac, which only supposes the sun's motion during the interval correctly known. Thus by the united means of the transit and Nautical Almanac, we shall have $\alpha \pm \alpha'$ given independently of the mural circle.

Allowing now that the polar point of the mural circle is well established by superior and inferior culminations of circumpolar stars, as well as by observations of the principal zodiacal stars, and that by observing alternately the upper and lower limb of the sun any vicious habit in observing is obviated, I designate with a, b, c, d, &c. the respective errors in seconds committed in the observations of the different declinations, x being as above the effect upon the right ascensions arising from an error of one second in declination, which during the equinox is a constant quantity of 2″.31. I find then $\alpha \pm \alpha'$ by the formula $\sin \alpha = \cot \omega \tan \delta$ and $\sin \alpha' = \cot \omega \tan \delta'$, and call m, n, o, p, &c. the differences between $\alpha \pm \alpha'$ thus calculated from the mural circle, and that known from observation with the transit and Nautical Almanac as above; then is

$$x(a+b) = m$$
$$x(a+c) = n$$
$$x(a+d) = o$$
$$x(a+\ldots\ldots$$
$$x\{(N-2)a + a + b + c + d + \ldots\} = m + n + o + p \ldots\ldots$$

N being the number of observations; or if these are not all brought in account, then is N − 1 the number of equations used.

But if no constant error exists in the observations with the mural circle, then is $a + b + c + d + = 0$, and $a\,x = \frac{m+n+o+p+\ldots\ldots}{N-2}$, $a\,x$ being the required correction of the sun's distance from the equinox.

Thus each distance from the equinox found by the formula $\sin \alpha = \tan \delta \cot \omega$ is successively corrected by a comparison with their observed sums or differences. I shall omit here the particulars, which are long and tedious, and simply give a short abstract of the results. During the equinox of September 1827, the following observations were made for determining the right ascensions of β Crucis* and 2 α Centauri.

* I have preferred β Crucis to α Crucis, which latter star also culminated with the sun during this equinox. But α Crucis consists of two stars of equal magnitude, as near to each other as those of Castor, which I feared might occasion inaccuracies in the observations with the small power of the telescope of the repeating circle.

Abstract of the Equal Altitudes and Comparisons with the Transit.

1827.	Sidereal Clock at Apparent Noon by Equal Altitudes of the Sun.	Transit more or less.	Culmination of β Crucis by Clock.		Observed Differences of Right Ascension between Sun and β Crucis Mean Place by Equal Altitudes for Noon and Midnight in Degrees.	Culmination of ζ a Centauri by Clock.		Observed Difference of Right Ascension between Sun and ζ a Centauri Mean Place for Noon and Midnight by Equal Altitude in arc.
			By Equal Altitudes.	Transit more or less.	By Equal Altitudes with Reduction for Aberration and Nutation to Mean Place and Precession to September 23.	By Equal Altitudes.	Transit more or less.	By Equal Altitudes with Reduction for Aberration, Nutation and Precession to the Mean Place, September 23.	
	h m s	s	h m s	s	h m s	h m s	s	h m s	° ′ ″
Aug. 31	10 34 23.805	0.0	12 37 44.343	−0.29	12 37 45.005	30 50 18			
Sept. 1	10 38 2.268	+0.4	12 37 44.34	+0.09	„ „ 45.005	29 55 41.05			
S. Mid. 1	22 39 50.273	.....	12 37 44.34	.....	„ „ 45.005	29 28 40.98			
Sept. 2	10 41 39.441	.....	12 37 44.34	.....	„ „ 45.005	29 1 23.46			
3	10 45 17.550	+0.52	12 37 44.34	+0.25	„ „ 45.005	28 6 51.825			
4	10 48 53.975	+0.63	12 37 44.34	+0.42	„ „ 45.005	27 12 45.45			
10	11 10 33.513	−0.426	12 37 43.497	+0.04	„ „ 44.22	21 47 40.69			
11	11 14 8.964	−0.82	12 37 43.585	−0.19	„ „ 44.308	20 53 51.17			
Mid. 11	23 15 57.578	.....	.....	.....	.....	20 36 40.305			
13	11 21 20.411	.....	12 37 43.575	−0.5	„ „ 44.311	19 5 58.5			
14	11 24 55.967	+0.608	12 37 43.53	.....	„ „ 44.272	18 12 4.575			
Mid. 14	.....	.....	0 37 43.795	.....	„ „ 44.54		h m s	s	h m s	° ′ ″
15	11 28 32.033	+0.607	12 37 44.266	−0.486	„ „ 44.34	17 18 14.74	14 28 0.29	−0.35	14 28 0.404	44 52 5.565
Mid. 15	23 30 20.16	.....	0 37 44.898	.....	„ „ 45.65	16 51 22.35				
16	11 32 7.691	+0.389	12 37 44.267	−0.397	„ „ 45.024	16 24 19.995	14 28 0.325	.....	14 28 0.465	43 58 11.595
Mid. 16	23 33 56.744	.....	0 37 44.688	.....	„ „ 45.449	15 57 10.575				
19	.....	.....	12 37 46.516	.....	„ „ 47.286	13 49 48.09	14 28 2.365	−0.24	14 28 2.473	41 16 35.895
Mid. 19	.....	.....	0 37 47.005	.....	„ „ 47.776	13 15 56.805	2 28 3.944	.....	2 28 3.460	40 49 52.065
20	11 46 31.898	+0.392	12 37 46.988	−0.25	„ „ 47.760	12 48 57.93	14 28 3.29	.....	14 28 3.515	40 22 54.955
Mid. 20	23 48 20.09	.....	0 37 47.002	.....	„ „ 47.774	12 21 55.96	2 28 2.876	.....	2 28 3.103	39 55 45.195
21	11 50 7.574	+0.596	12 37 47.188	.....	„ „ 47.941	11 55 5.05				
22	.....	.....	12 37 47.715	.....	„ „ 48.473					
Mid. 22	.....	.....	0 37 48.056	.....	„ „ 48.816	.....	2 28 3.577			
23	11 57 20.00	+0.60	12 37 48.474	−0.60	„ „ 49.236	10 7 18.54	14 28 4.260	−0.36	14 28 4.536	37 41 7.94
Mid. 23	23 59 9.495	.....	0 37 48.906	.....	„ „ 49.669	9 40 2.81				
24	12 0 56.807	+0.293	12 37 48.859	.....	„ „ 49.623	9 13 12.94				
Mid. 24	0 2 44.544	.....	0 37 48.96	.....	„ „ 49.733	8 46 17.835				
25	12 4 33.492	0.0	12 37 48.801	+0.23	„ „ 49.566	8 19 1.11	14 28 5.170	−0.865	14 28 7.103	35 52 59.94
Mid. 25	0 6 21.4	.....	0 37 49.828	.....	„ „ 50.695	7 52 19.425	2 28 5.662	.....	2 28 6.023	35 26 8.85
26	12 8 10.156	+0.506	12 37 50.785	−0.53	„ „ 51.552	7 25 20.94	14 28 6.349	+0.32	14 28 6.688	34 59 7.98

From the 31st of August to the 4th of September, the rate of the clock was absolutely = 0, so that I have made use of the mean of the equal altitudes observed during that period.

Observed Declinations and Distances of the Sun from the Equinox.

1827.	Barom.	Therm. Ins.	Therm. Out.	Sun's Observed South Polar Distance.	Parall.	Bunn's Refraction.	Semidiameter.	Sun's True Declination by Observation.	Sun's Dist. from Equinox deduced from the Obs.
	inches.	°	°	° ′ ″	″	″	′ ″	° ′ ″	° ′ ″
Sept. 10	29.836	60	68	95 2 2.35	5.25	44.86	15 55.25	5 18 37.21	
11	29.75	59	69.5	94 39 14.97	5.23	43.94	„ 55.50	4 55 49.18	11 27 54
12	29.485	66	82	94 16 30.70	5.20	41.90	„ 55.65	4 33 3.05	10 34 6
13	29.73	60	68	93 53 36.2	5.17	42.89	„ 56.00	4 10 9.92	9 40 12.5
14	29.85	58.3	62	94 2 30.22	5.18	43.82	„ 56.20	3 47 12.66	8 46 22.0
15	29.904	58	61.3	93 7 30.12	5.09	42.55	„ 56.5	3 24 4.08	7 52 16
16	29.964	55.5	63	93 16 25.42	5.09	42.66	„ 56.8	3 1 6.19	6 58 44
19	30.140	57	66.5	91 34 45.05	4.89	40.11	„ 57.57	1 51 27.84	4 17 10.2
20	30.064	59.5	68	91 43 26.7	4.9	40.03	„ 57.83	1 28 4.00	3 23 5.2
21	29.774	58	78	90 48 12.4	4.79	37.61	„ 58.10	1 4 43.32	2 29 12.0
23	29.864	60.5	65.7	90 1 21.57	4.71	37.52	„ 58.6	0 17 52.98	0 41 12.5
24	29.642	55	68	90 0 4.6	4.72	37.27	„ 58.87	0 5 21.72	0 12 21.2
25	29.724	56	68.6	89 14 36.47	4.59	36.08	„ 59.17	0 28 52.87	1 6 33.4
26	29.992	58	69.2	89 23 13.32	4.62	36.57	„ 59.44	0 52 14.17	2 0 24.0
27	30.065	57	69.5	88 59 42.45	4.57	36.04	„ 59.70	1 15 45.78	2 54 40.8
29	29.978	55	65.	87 40 57.4	4.41	34.50	16 0.33	2 2 32.18	4 42 47.5
30	30.170	57	63.5	87 17 28.7	4.35	34.29	„ 0.6	2 26 0.76	5 37 11.6
Oct. 1	30.034	55	61	87 26 14.39	4.38	34.52	„ 0.87	2 49 16.34	6 31 12.2
2	30.14	56	60.5	87 2 50.2	4.35	34.48	„ 1.13	3 12 41.14	7 25 42.3

Right Ascensions of β Crucis and 2 α Centauri.

1827.	Sun's Corrected Distance from Equinox.	Diff. of R between Sun's True and β Crucis Mean Place, Sept. 23.	β Crucis Mean R, Sept. 23, 1827.	Diff. R between Sun's True and 2 α Centauri Mean Place, Sept. 23.	2 α Centauri Mean R, September 23, 1827.
Aug. 31	° ′ ″ 21 24 21.3	° ′ ″ 30 50 18.0	° ′ ″ 189 25 56.7		
Sept. 1	20 30 9	29 55 41.05	„ „ 32.05		
2	19 35 37.1	29 1 23.46	„ „ 45.40		
3	18 41 5.2	28 6 51.82	„ „ 46.6		
4	17 46 51.3	27 12 45.45	„ „ 54.1		
10	.....	21 47 40.69	„ „ 38.5		
11	11 28 13.8	20 53 51.2	„ „ 37.5		
Mid. 11	.....	20 26 40.35	„ „ 29.4		
12	10 34 10				
13	9 40 12.5	9 5 58.5	„ „ 46.0		
14	8 46 24.7	18 12 4.6	„ „ 39.9		
15	7 52 30.1	17 18 14.7	„ „ 44.6	° ′ ″ 44 52 5.565	° ′ ″ 216 59 35.46
15	.....	16 51 22.35	„ „ 49.95		
16	6 58 34.8	16 24 20.0	„ „ 45.2	43 58 11.595	„ „ 36.79
16	.....	15 57 10.57	„ „ 51.0		
19	4 16 59.0	13 42 48.1	„ „ 49.1	41 16 35.895	„ „ 36.89
19	.....	13 15 56.8	„ „ 52.7	40 49 52.065	„ „ 48.0
20	3 23 9.3	12 48 57.9	„ „ 48.6	40 22 54.255	„ „ 44.95
20	.....	12 21 55.3	„ „ 43.2		„ „ 33.09
21	2 49 14.9	11 55 5.5	„ „ 50.6	39 55 45.195	
23	0 41 22.7	10 7 18.5	„ „ 55.8	37 41 7.94	„ „ 45.24
23	.....	9 40 2.6	„ „ 38.24		
24	0 12 33.95	9 13 12.2	„ „ 46.1		
24	.....	8 46 17.83	„ „ 54.45		
25	1 6 39.3	8 19 1.1	„ „ 40.4	35 52 59.94	„ „ 39.2
25	.....	7 52 19.42	„ „ 56.9	35 26 8.85	„ „ 46.35
26	2 0 35.7	7 25 20.9	„ „ 56.6	34 59 7.98	„ „ 43.68
Means			189 25 46.514	.....	216 59 40.965
Precession to Jan. 1, 1828.....			13.855	.....	18.058
Solar nutation			0.705	.....	0.651
Mean R, Jan. 1, 1828, of β Crucis..			189 26 1.074	2 α Centauri	216 59 59.674

Equinox, March 1828,

Containing Observations for determining the Right Ascensions of β Hydri and α Eridani.

1828.	Sun's Observed South Pol. Dist.	Barom.	Ther.	Limb.	Refract. Parall.	Semidiameter.	Sun's True Declination.	Distance from Equinox.	Sun's Apparent Right Ascen.	Sun's Culminat. by Equal Alt.	Clock Fast.
	° ′ ″	inches.	°		″	′ ″	° ′ ″	° ′ ″	h m s	h m s	s
Mar. 5	84 10 12.05	29.51	80	U	24.53	16 8.7	6 5 31.7 S.	14 14 14	23 3 3.07		
6	84 33 14.35	29.52	75	L	25.20	„ 8.4	5 42 28.9 S.	13 18 58	„ 6 44.1	h m s	s
7	84 24 8.9	29.77	73	U	25.39	„ 8.0	5 19 17.7 S.	12 23 39	„ 10 25.4	23 10 45.51	20.04
8	85 19 41.8	29.90	77	L	26.37	„ 7.8	4 55 59.6 S.	11 28 21	„ 14 6.6	„ 14 26.46	19.80
11	85 57 43.4	29.73	84	U	26.46	„ 7.1	3 45 43.0 S.	8 42 52.5	„ 25 8.57	„ 25 26.92	18.35
13	86 44 50.9	29.93	81	U	27.56	„ 6.5	2 58 35.0 S.	6 52 52	„ 32 28.5	„ 32 46.57	18.07
14	87 8 29.4	29.88	90.7	U	27.42	„ 6.2	2 34 56.9 S.	5 57 56	„ 36 8.2	„ 36 25.92	17.30
16	88 28 2.45	30.21	80	L	30.16	„ 5.7	1 47 33.1 S.	4 8 7.5	„ 43 21.5		
17	.....	.....	.....	.....	.....	.....	.....	.....	.....	„ 47 23.0	16.0
18	89 15 26.3	30.13	81	L	30.76	„ 5.2	1 0 8.1 S.	2 18 37	„ 50 45.53	„ 51 0.14	14.61
19	89 6 52.7	30.02	96	U	29.70	„ 5.0	0 36 32.6 S.	1 24 13	„ 54 23.15	„ 54 37.83	14.68
20	90 2 41.8	29.86	100	L	30.15	„ 4.7	0 12 52.7 S.	0 29 41	„ 58 1.27		
21	90 26 21.0	29.76	83	L	31.81	„ 4.3	0 10 48.5 N.	0 24 54	0 1 39.6	0 1 51.91	12.30
28	92 39 8.15	29.83	81.3	U	34.66	„ 2.6	2 55 45.4 N.	6 43 18	„ 26 53.2		
29	93 2 44.95	29.83	71.5	U	36.26	„ 2.4	3 19 23.6 N.	7 41 22	„ 30 45.47		
30	.....	.....	.....	.....	.....	.....	.....	.....	.....	„ 34 36.46	13.19
Apr. 1	94 12 32.6	29.67	78.5	U	37.08	„ 1.3	4 29 11.0 N.	10 24 59	„ 41 39.92	„ 41 52.52	12.60
2	95 7 31.4	29.61	75	L	38.61	„ 1.0	4 52 9 N.	11 19 14	„ 45 16.93	„ 45 31.16	14.23
3	94 58 33.1	29.88	65.7	U	39.60	„ 0.0	5 15 12.7 N.	12 13 56	„ 48 55.73	„ 49 8.95	13.22
4	95 53 29.95	30.01	66.5	L	41.20	„ 0.2	5 38 10.95 N.	13 8 41	„ 52 34.73		
5	96 16 19.5	30.03	68.2	L	41.60	„ 0.1	6 1 1.0 N.	14 3 23	„ 56 13.53	„ 56 25.72	12.19
6	96 6 59.8	30.20	71.7	U	41.27	15 59.9	6 23 40.8 N.	14 57 58.7	„ 59 51.91		
7	.....	.....	.....	.....	.....	.....	.....	.....	.....	1 3 45.0	14.1
8	.....	.....	.....	.....	.....	.....	.....	.....	.....	„ 7 24.46	14.3
9	97 14 20.9	29.76	84.0	U	41.17	„ 59.1	7 31 1.2 N.	17 42 5	1 10 48.33	„ 11 3.59	15.26
10	98 8 41.0	29.71	72.5	L	43.58	„ 58.6	7 53 26.0 N.	18 37 26.5	1 14 29.77		
11	97 58 44.4	29.87	69.0	U	43.90	„ 58.3	8 15 26.6 N.	19 32 12.5	1 18 8.85	„ 18 23.57	14.72
12	98 52 42.7	29.91	69.3	L	45.49	„ 57.4	8 37 30.8 N.	20 27 30.5	1 21 50.03	„ 22 2.65	12.62
13	99 14 30.2	30.22	67	L	46.68	„ 57.8	8 59 19.1 N.	21 22 35	1 25 30.33	„ 25 41.73	11.40

The mean inside Temperature was 75°.

For those days when equal altitudes but no declinations of the sun were observed, the error of the clock has been derived from the Solar Tables. In the present observations no corrections have been applied to the sun's distances from the equinox derived from the observed declinations; and in the last equinox this correction did not amount to one second in arc upon the mean of the right ascensions.

Mean Right Ascensions.

β Hydri.									α Eridani.								
1828.	Super. and inferior Culmi^{n} of β Hydri by Equal Alt.			Apparent Right Ascension.			Red^{n} to M^{n} Place, Jan. 1, 1828.	Mean R, Jan. 1, 1828, in Time.			1828.	Super. and Inferior Culmi^{n} of α Eridani by Equal Alt.			Apparent Right Ascension.			Red^{n} to M^{n} Place, Jan. 1, 1828.	Mean R, Jan. 1, 1828, in Time.		
	h	m	s	h	m	s	s	h	m	s		h	m	s	h	m	s	s	h	m	s
Mar. 7	0	16	48.89	0	16	28.85	+7.37	0	16	36.22	Mar. 21	1	31	26.32	1	31	14.02	+2.115	1	31	16.135
8	0	16	47.88	,,	,,	28.08	7.39	,,	,,	35.47	30	1	31	28.89	,,	,,	15.705	2.205	,,	,,	17.91
8	12	16	45.21	,,	,,	25.61	7.393	,,	,,	33.00	Apr. 1	1	31	29.06	,,	,,	16.46	2.212	,,	,,	18.673
10	12	16	45.85	,,	,,	27.25	7.43	,,	,,	34.68	2	13	31	29.25	,,	,,	15.84	2.215	,,	,,	18.055
11	0	16	43.73	,,	,,	25.38	7.45	,,	,,	32.83	2	1	31	29.04	,,	,,	14.81	2.219	,,	,,	17.029
12	0	16	42.6	,,	,,	24.65	7.462	,,	,,	32.11	2	13	31	28.11	,,	,,	14.39	2.226	,,	,,	16.616
13	0	16	43.67	,,	,,	25.60	7.48	,,	,,	33.08	3	1	31	28.05	,,	,,	14.83	2.233	,,	,,	17.063
13	12	16	42.02	,,	,,	24.15	7.487	,,	,,	31.64	5	1	31	28.57	,,	,,	16.38	2.241	,,	,,	18.621
14	0	16	41.85	,,	,,	24.55	7.495	,,	,,	32.04	7	1	31	29.79	,,	,,	15.68	2.25	,,	,,	17.93
16	12	16	40.68	,,	,,	24.93	7.527	,,	,,	32.46	9	1	31	29.81	,,	,,	14.55	2.25	,,	,,	16.80
18	12	16	41.54	,,	,,	26.93	7.559	,,	,,	34.49	9	13	31	29.55	,,	,,	14.42	2.25	,,	,,	16.676
19	0	16	39.69	,,	,,	25.01	7.534	,,	,,	32.54	10	1	31	29.06	,,	,,	14.07	2.247	,,	,,	16.317
29	0	16	39.86	,,	,,	26.67	7.510	,,	,,	34.18	10	13	31	29.54	,,	,,	14.69	2.247	,,	,,	16.937
31	12	16	40.29	,,	,,	27.13	7.496	,,	,,	34.63	11	1	31	29.96	,,	,,	15.24	2.247	,,	,,	17.487
31	0	16	41.11	,,	,,	28.31	7.49	,,	,,	35.8	11	13	31	29.12	,,	,,	15.45	2.246	,,	,,	17.696
Apr. 1	12	16	40.16	,,	,,	28.51	7.483	,,	,,	35.99	12	1	31	28.76	,,	,,	16.14	2.246	,,	,,	18.386
1	0	16	42.12	,,	,,	25.93	7.47	,,	,,	33.40	12	13	31	28.66	,,	,,	16.65	+2.246	,,	,,	18.896
2	12	16	40.71	,,	,,	27.89	7.463	,,	,,	35.35											
2	0	16	39.44	,,	,,	27.36	7.456	,,	,,	34.82	Mean Right Ascension, Jan.1, 1828, α Eridani								1	31	17.484
3	12	16	40.41	,,	,,	26.22	7.445	,,	,,	33.66											
3	0	16	41.64	,,	,,	27.51	7.435	,,	,,	34.95											
4	0	16	41.22	,,	,,	28.94	7.424	,,	,,	36.36											
5	0	16	40.3	,,	,,	29.03	7.414	,,	,,	36.44											
9	0	16	41.92	,,	,,	26.66	7.315	,,	,,	33.97											
10	12	16	41.44	,,	,,	26.32	7.286	,,	,,	33.61											
10	0	16	41.59	,,	,,	26.60	7.278	,,	,,	33.87											
11	0	16	41.10	,,	,,	26.38	7.259	,,	,,	33.64											
12	0	16	39.02	,,	,,	26.40	+7.232	,,	,,	33.63											
Mean Right Ascension, Jan.1, 1828, β Hydri								0	16	34.04											

Before the conjunction the superior culminations take place immediately after noon of the given, but after conjunction immediately before noon of the next following day; but in the above Table they have been reduced to, and placed opposite to the days nearest the noon whereon they had been observed.

I remark again that my object in observing equal altitudes was to have a check upon the transit, by a method independent of the errors arising from imperfections of the latter instrument, which were the more dangerous as, inclining all towards the same side, their apparent consistency made it difficult to discover their cause, and to subject them to mathematical laws, which we shall endeavour to do hereafter. Although observations of equal altitudes will deviate more on each side of their mean, this mean may be nearer the

truth than that of the transit observations: it must be recollected at the same time that β Hydri is within 12° of the Pole, and all the other stars are circumpolar with the exception of Canopus.

Besides the times of the equinoxes, equal altitudes of various stars were observed during their conjunction and opposition with the sun, and thus the right ascensions of the following stars have been established.

Stars.	Mean Æ beginning of 1828.			Annual Variat.	Number of Observations*.	
	°	′	″	″		
β Hydri	4	8	30.6	39.09	27	Set of equal Altitudes
α Eridani	22	49	26.13	33.428	31	——
Canopus	95	2	1.9	19.81	22	——
β Argus	137	48	59.36	10.908	13	——
β Crucis	189	26	1.3	51.296	30	——
2 α Centau.	217	0	2.8	66.856	20	——

Each set of equal altitudes comprehends from 20 to 50 observations on each side of the meridian. A set of absolute altitudes has been counted for half a set of equal altitudes.

The above stars in their upper and lower culminations, form in different parts of the meridian so many meridian marks established without the assistance of the transit: thus it is not likely that the optical axis of this instrument could pass on the same day at the precise time through each of them, unless the plane in which it moves be that of the meridian.

South Polar Distances of Circumpolar Stars deduced from their Superior and Inferior Culminations observed at Paramatta.

The refractions and reductions for aberration, nutation and precession to the mean places in the beginning of 1828, have been computed for each observation separately, and their mean has been applied to the mean of the microscopes for upper and lower culminations. The half difference between the two thus corrected, gives the mean south polar distance for January 1, 1828. The half sum is the polar point, which will serve hereafter for the reduction of the remainder of the stars.

* In determinations of positions of stars or of geographical places, the number and quality of observations upon which they are founded should always be stated, in order that their due weight may be attached to them in comparisons with succeeding observations.

o Octantis. (Ann. Var. + 19″.967.)

Superior Culmination.

1826.	Barom.	Therm.	Microscopes. I.	II.	III.	IV.	Refr.	Red. +
	inches.	°	° ′ ″	′ ″	′ ″	′ ″	′ ″	″
June 23	29.85	37	1 22 53	22 50	22 53	22 57.2	1 26.33	4.19
26	30.14	29	„ 22 56.7	22 54	22 58	23 1.4	„ 28.52	4.05
27	30.22	30	„ 23 2.3	23 0	23 4	23 8.7	„ 28.57	3.98
28	30.15	33	„ 22 53	22 50	22 55	22 57.5	„ 27.87	3.94
30	30.14	34	„ 22 56.1	22 55.7	23 3.6	23 3.0	„ 27.67	3.88
June 27	... Mean ...		1 22 56	22 53.9	22 58.5	23 1.6	1 27.79	4.01
	Refraction		−1 27.79	1 27.79	1 27.79	1 27.79		
	Reduction		+4.01	4.01	4.01	4.01		
	Superior Culminat.		1 21 32.22	21 30.12	21 34.72	21 37.82		
	Inferior Culminat...		359 59 53.46	59 51.56	59 58.66	0 0.96		
	Half Diff. S. P. D.		0 40 49.38	40 49.28	40 48.03	40 48.03		

Inferior Culmination.

1826.	Barom.	Therm.	Microscopes. I.	II.	III.	IV.	Refr.	Red. −
	inches.	°	° ′ ″	′ ″	′ ″	′ ″	′ ″	″
June 23	30.03	44	0 1 22.4	1 17.2	1 28.3	1 30.5	1 30.1	4.19
27	30.16	41.5	„ 1 26.7	„ 28.5	„ 33.5	„ 38.6	„ 30.9	3.98
28	30.21	43	„ 1 29.0	„ 28.7	„ 36	„ 36.7	„ 30.8	3.94
July 1	29.98	48	„ 1 32.7	„ 29.0	„ 34.0	„ 35	„ 29.2	3.84
July 27	... Mean ...		0 1 27.7	1 25.8	1 32.9	1 35.2	1 30.25	3.99
	Refraction		−1 30.25	1 30.25	1 30.25	1 30.25		
	Reduction		−3.99	3.99	3.99	3.99		
			359 59 53.46	59 51.56	59 58.66	0 0.96		

Mean of 4 Microscopes ..... 0° 40′ 48″.46 by 9 Observ.

1827.

1827.	Barom.	Therm.	Microscopes. I.	II.	III.	IV.	Refr.	Red. −
	inches.	°	° ′ ″	′ ″	′ ″	′ ″	′ ″	″
June 23	29.85	47	0 57 22.7	57 26.7	57 45.2	57 33.0	1 25.22	14.13
26	30.05	45	„ „ 28.5	„ 31.0	„ 33.3	„ 36.1	„ 27.10	14.31
27	30.01	36	„ „ 36.0	„ 40.7	„ 44.7	„ 50.3	„ 28.54	14.35
29	29.86	34	„ „ 42.0	„ 42	„ 48.5	„ 51.3	„ 28.47	14.42
June 26.2	... Mean...		0 57 32.3	57 35.4	57 42.9	57 42.67	1 27.33	14.3
	Refract. and Reduct.		−1 41.6	1 41.6	1 41.6	1 41.6		
	Superior Culminat.		0 55 50.67	56 53.8	56 01.3	56 01.07		
	Inferior Culminat...		359 34 6.8	34 8.1	34 15.6	34 20.5		
	Half Diff. S. P. D.		40 51.9	57 52.8	57 52.8	57 50.25		

1827.	Barom.	Therm.	Microscopes. I.	II.	III.	IV.	Refr.	Red. +
	inches.	°	° ′ ″	′ ″	′ ″	′ ″	′ ″	″
June 24	30.00	46	359 35 19.5	35 23	35 27	35 32.2	1 29.66	14.22
25	30.07	60.5	„ 35 23	„ 20.0	„ 34.4	„ 37.2	„ 27.27	14.25
27	30.02	50	„ 35 21	„ 24.5	„ 28.6	„ 35.3	„ 29.0	14.36
June 25.3	... Mean...		359 35 21.2	35 22.5	35 30.0	35 34.9	1 28.64	14.28
	Refract. and Reduct.		−1 14.4	1 14.4	1 14.4	1 14.4		
			359 34 6.8	34 8.1	34 15.6	34 20.5		

Mean of 4 Microscopes ..... 0° 40′ 51″.94 by 7 Observ.

1828.

1828.	Barom.	Therm.	Microscopes. I.	II.	III.	IV.	Refr.	Red. −
	inches.	°	° ′ ″	′ ″	′ ″	′ ″	′ ″	″
June 17	30.13	36	0 56 3	56 5	56 12	56 11.2	1 27.3	31.65
18	30.32	38	0 56 5.5	56 7	56 10.7	56 8.2	1 27.5	31.65
June 17.5	... Mean...		0 56 4.2	56 6.0	56 11.3	56 9.7	1 27.4	31.65
	Refract. and Reduct.		−1 59.0	1 59.1	1 59.0	1 59.1		
	Superior Culminat.		0 54 05.2	54 06.9	54 12.3	54 10.6		
	Inferior Culminat...		359 32 26.6	32 29.0	32 29.9	32 31.5		
	Half. Diff. S. P. D.		0 40 49.3	40 48.9	40 51.2	40 49.6		

1828.	Barom.	Therm.	Microscopes. I.	II.	III.	IV.	Refr.	Red. +
	inches.	°	° ′ ″	′ ″	′ ″	′ ″	′ ″	″
June 19	30.34	49.5	359 33 25	33 27.5	33 28.3	33 30	1 30.1	31.65
	Refract. and Reduct.		−58.4	58.5	58.4	58.5		
			359 32 26.6	32 29.0	32 29.9	32 31.5		

Mean of 4 Microscopes ..... 0° 40′ 49″.75 by 3 Observ.

Mean S. P. D. of o Octantis, Jan. 1, 1828 ..... 0° 40′ 50″.11 by 19 Observ.

σ Octantis. (Ann. Var. — 5″.739.) The South Polar Star.

Superior Culmination.

1827.	Barom.	Therm.	Microscopes. I.	II.	III.	IV.	Refr.	Red. +
	inches.	°	° ′ ″	′ ″	′ ″	′ ″	′ ″	′ ″
Aug. 30	29.70	63	1 1 14.00	1 16.3	1 28	1 24.1	1 21.23	11.94
Refract. and Reduct.			−1 9.3	1 9.3	1 9.3	1 9.3		
Superior Culminat.			1 0 4.7	0 7.0	0 18.7	0 14.8		
Inferior Culminat...			359 29 39.3	29 46.5	29 52.0	29 50.6		
Half Diff. S. P. D.			0 45 12.7	45 10.25	45 13.85	45 12.1		

Inferior Culmination.

1827.	Barom.	Therm.	Microscopes. I.	II.	III.	IV.	Refr.	Red. −
	inches.	°	° ′ ″	′ ″	′ ″	′ ″	′ ″	′ ″
Aug. 28	30.5		359 31 22	31 25	31 32.2	31 35.5	1 29.09	11.99
30	30.02	38	359 31 23	31 28	31 33.4	31 33.3	1 31.39	11.94
Sept. 13	29.83	41.4	359 31 18.8	32.5	31 36.3	31 30.0	1 30.91	11.25
Aug. 30 ... Mean ...			359 31 21.3	31 28.5	31 34.0	31 32.6	1 30.23	11.73
Refract. and Reduct.			−1 42.0	1 42.0	1 42.0	1 42.0		
			359 29 39.3	29 46.5	29 52.0	29 50.6		

Mean of 4 Microscopes ..... 0° 45′ 12″.22 by 4 Observ.

1828.	Barom.	Therm.	Microscopes. I.	II.	III.	IV.	Refr.	Red. +
	inches.	°	° ′ ″	′ ″	′ ″	′ ″	′ ″	′ ″
Aug. 29	30.10	61.3	0 59 43	59 45.5	59 49	59 51.5	1 22.71	15.38
30	30.24	64.7	„ „ 53.6	„ 43	„ 52	„ 56.7	„ 22.52	„ 36
31	30.30	58.2	„ „ 51.5	„ 44	„ 49.6	„ 55	„ 23.80	„ 34
Sept. 1	30.20	70	„ „ 46.0	„ 43	„ 51.5	„ 53.7	„ 21.52	„ 31
2	30.15	67	„ „ 44.2	„ 43.2	„ 50.0	„ 53	„ 21.88	„ 28
Aug. 31 ... Mean ...			0 59 48.1	59 43.7	59 50.4	59 54	1 22.48	15.33
Refract. and Reduct.			−1 7.1	1 7.2	1 7.1	1 7.2		
Superior Culminat.			0 58 41.0	58 36.5	58 43.5	58 46.8		
Inferior Culminat...			359 28 12.9	28 17.3	28 17.6	28 20.5		
Half Diff. S. P. D.			0 45 14.05	45 9.6	45 12.8	45 13.2		

1828.	Barom.	Therm.	Microscopes. I.	II.	III.	IV.	Refr.	Red. −
	inches.	°	° ′ ″	′ ″	′ ″	′ ″	′ ″	′ ″
Sept. 2	30.15	42	359 30 ″2	30 3.7	30 ″7	30 ″8	1 31.06	15.28
3	29.85	51	„ 29 56	30 1.0	30 3.5	„ 5.7	„ 28.55	15.26
7	29.62	54.5	„ 29 53.3	29 58	29 58	„ 1.5	„ 27.24	15.06
8	29.91	41.5	„ 29 58.0	30 1	30 1.2	„ 6.8	„ 30.40	15.00
9	29.80	45	„ 29 57.5	30 0	30 0.5	„ 5.0	„ 29.48	14.93
11	30.20	36	„ 30 0.0	30 5	30 5	„ 5.7	„ 32.29	14.79
Sept. 6.7 ... Mean ...			359 29 57.8	30 2.2	30 2.5	30 5.45	1 29.84	15.05
Refract. and Reduct.			−1 44.9	1 44.9	1 44.9	1 44.9		
			359 28 12.9	28 17.3	28 17.6	28 20.5		

Mean of 4 Microscopes ..... 4° 45′ 12″.41 by 11 Observ.

Mean S. P. D. of σ Octantis, Jan. 1, 1828 ..... = 0° 45′ 12″.32 by 15 Observ.

τ Octantis. (Ann. Var. + 19″.293.)

Superior Culmination.

1826.	Barom.	Therm.	Microscopes. I.	II.	III.	IV.	Refr.	Red. +
	inches.	°	° ′ ″	′ ″	′ ″	′ ″	′ ″	″
June 9	29.95	58	2 16 40.8	16 42	16 49.2	16 48.9	1 20.29	2.72
10	30.03	35	„ „ 43	„ 36.3	16 46.1	16 53.1	„ 24.99	2.69
13	30.20	32	„ „ 40.2	„ 41.0	16 52	16 55.5	„ 25.25	2.61
17	29.85	45	„ „ 44.5	„ 48.7	16 50.0	16 55.3	„ 22.46	2.64
18	30.09	31.5	„ „ 44.2	„ 50.0	16 53.7	17 0.5	„ 25.05	2.62
19	30.05	41	„ „ 55.0	„ 51.5	17 1.0	17 4.1	„ 23.37	2.61
June 13 ... Mean ...			2 16 44.6	16 44.9	16 52.9	16 56.2	1 23.45	2.65
Refract. and Reduct.			−1 20.8	1 20.8	1 20.8	1 20.8		
Superior Culminat.			2 15 23.8	15 24.1	15 32.1	15 35.4		
Inferior Culminat...			359 6 0.8	6 1.3	6 7.4	6 6.0		
Half Diff. S. P. D.			1 34 41.5	34 41.4	34 42.3	34 44.7		

Inferior Culmination.

1826.	Barom.	Therm.	Microscopes. I.	II.	III.	IV.	Refr.	Red. −
	inches.	°	° ′ ″	′ ″	′ ″	′ ″	′ ″	″
June 8	29.89	53	359 7 53	7 54.7	7 38.5	7 42.0	1 31.33	2.76
9	29.92	51	„ „ 35	„ 32.1	„ 42.6	„ 37.0	„ 31.80	2.72
10	30.03	51	„ „ 37	„ 31.7	„ 44.7	„ 42.0	„ 32.13	2.69
11	30.09	48	„ „ 35	„ 36.5	„ 43.0	„ 41.2	„ 32.86	2.66
12	30.15	48	„ „ 32	„ 37.0	„ 39.0	„ 41.4	„ 33.05	2.64
13	30.22	55	„ „ 38	„ 36.1	„ 45.1	„ 39.1	„ 31.98	2.61
14	30.18	44	„ „ 36.5	„ 42.7	„ 43.7	„ 41.2	„ 33.86	2.59
19	29.99	51	„ „ 40.0	„ 40.5	„ 42.5	„ 45.0	„ 32.0	2.61
June 12 ... Mean ...			359 7 35.8	7 36.4	7 42.4	7 41.1	1 32.38	2.66
Refract. and Reduct.			−1 35.0	1 35.1	1 35.0	1 35.1		
			359 6 0.8	6 1.3	6 7.4	6 6.0		

Mean of 4 Microscopes ..... 1° 34′ 41″.47 by 14 Observ.

τ Octantis. (Ann. Var. + 19″.293.)—(Continued.)

Superior Culmination.

1827.	Barom.	Therm.	Microscopes. I.	II.	III.	IV.	Refr.	Red. −
	inches.	°	° ′ ″	″	″	″	′ ″	″
May 27	30.15	49	1 51 8	51 14.3	51 25	51 21.0	1 22.34	14.98
June 1	30.27	40.3	„ 51 8.2	„ 17.3	„ 24.3	„ 23.5	„ 24.12	15.40
2	30.17	40	„ 51 13.8	„ 17.0	„ 26.2	„ 22.8	„ 23.87	15.42
4	30.14	56	„ 50 58.5	„ 3.5	„ 12.5	„ 12.0	„ 21.12	15.65
7	30.11	47	„ 51 7.0	„ 9.7	„ 19.2	„ 30.5	„ 22.57	15.73
13	29.85	40	„ 51 15.1	„ 22.4	„ 27.0	„ 29.3	„ 23.03	15.94
July 12	30.02	44	„ 51 13.0	„ 17.5	„ 22.2	„ 23.0	„ 22.8	14.90
June 10	... Mean ...		1 51 9.1	51 14.5	51 22.3	51 23.1	1 22.83	15.33
Refract. and Reduct.			−1 38.16	1 38.2	1 38.1	1 38.2		
Superior Culminat.			1 49 30.94	49 36.3	49 44.2	49 44.9		
Inferior Culminat.			358 40 8.1	40 15.4	40 23.4	40 23.5		
Half. Diff. S. P. D.			1 34 41.4	34 40.45	34 40.4	34 40.7		

Inferior Culmination.

1827.	Barom.	Therm.	Microscopes. I.	II.	III.	IV.	Refr.	Red. +
	inches.	°	° ′ ″	′ ″	′ ″	′ ″	′ ″	″
May 24	30.12	60	358 41 51	41 54	41 42	41 37.5	1 30.44	14.56
25	30.07	58	„ „ 24.5	„ 29.5	„ 29.5	„ 36.7	„ 30.83	14.66
27	30.122	56	„ „ 24	„ 30.0	„ 33.7	„ 36.1	„ 31.35	14.98
June 2	30.204	55	„ „ 25	„ 31.0	„ 36.1	„ 41.0	„ 30.56	15.42
8	30.122	57	„ „ 21	„ 28.5	„ 40.0	„ 40.3	„ 31.17	15.89
14	29.79	52	„ „ 27.5	„ 33.0	„ 45.0	„ 43.3	„ 31.10	15.93
June 1	... Mean ...		358 41 23.8	41 31.0	41 39.1	41 39.15	1 30.91	15.24
Refract. and Reduct.			−1 15.7	1 15.6	1 15.7	1 15.67		
			358 40 8.1	40 15.4	40 23.4	40 23.48		

Mean of 4 Microscopes .....1° 34′ 40″.74 by 13 Observ.

Superior Culmination.

1828.	Barom.	Therm.	Microscopes. I.	II.	III.	IV.	Refr.	Red. −
	inches.	°	° ′ ″	″	″	″	′ ″	″
May 23	30.27	47.2	1 49 41.8	49 48	49 57.7	49 52.5	1 22.95	32.33
27	29.99	39.3	„ „ 57.7	„ 57	49 59.3	49 58	„ 23.50	32.79
29	29.83	34.7	„ „ 44.0	„ 54	49 58.5	49 49.8	„ 23.80	33.01
30	29.80	39.0	„ „ 40.2	„ 46.5	49 54	49 44.2	„ 23.0	33.12
31	29.93	35	„ „ 49	„ 52	49 54.2	49 53	„ 24.0	33.23
June 1	30.05	35	„ „ 48	„ 52.5	49 58.6	49 53.5	„ 24.35	33.31
2	29.59	38.3	„ „ 46.5	„ 50.0	49 55.5	49 53.2	„ 22.58	33.42
7	29.43	39	„ „ 46.3	„ 52.5	49 55.1	49 51.0	„ 21.99	33.63
9	29.69	50	„ „ 43	„ 49.6	49 54.1	49 52.7	„ 20.93	33.69
11	29.93	33	„ „ 55	„ 58.5	50 2	50 2	„ 24.35	33.76
12	30.05	29	„ „ 53.2	„ 56.4	49 59.5	50 2	„ 25.33	33.79
17	30.112	39	„ „ 58	„ 54.0	49 58.3	49 58.5	„ 23.86	33.80
19	30.33	33	„ „ 52	„ 54	50 0.0	49 57	„ 25.44	33.83
20	30.96	34	„ „ 54	„ 54.6	50 1.0	49 59.2	„ 25.10	33.85
June 5	.3...Mean...		1 49 49.76	49 52.8	49 57.6	49 55.0	1 23.65	33.397
Refract. and Reduct.			−1 57.05	1 57.05	1 57.1	1 57.0		
Superior Culminat.			1 47 52.71	47 55.75	48 0.5	47 58.0		
Inferior Culminat.			358 38 27.7	38 33.8	38 37.7	38 33.2		
Half. Diff. S. P. D.			1 34 42.5	34 41.0	34 41.4	34 42.4		

Inferior Culmination.

1828.	Barom.	Therm.	Microscopes. I.	II.	III.	IV.	Refr.	Red. +
	inches.	°	° ′ ″	′ ″	′ ″	′ ″	′ ″	″
May 23	30.22	56	358 39 26	39 32.7	39 36	39 30	1 31.66	32.33
25	30.14	56	„ „ 29	„ 35.0	„ 40	„ 35	„ 31.42	32.54
28	29.87	56	„ „ 24.4	„ 33	„ 36.4	„ 32	„ 30.59	32.90
30	29.79	51	„ „ 27.4	„ 33.3	„ 36	„ 30	„ 31.27	33.10
31	29.82	50.3	„ „ 25.0	„ 33	„ 35.5	„ 27	„ 31.54	33.20
June 1	30.01	43	„ „ 25	„ 30.5	„ 35.6	„ 30.4	„ 33.38	33.31
2	29.99	53	„ „ 21	„ 29	„ 33	„ 30	„ 31.44	33.42
4	29.94	49	„ „ 21.2	„ 30	„ 30	„ 27	„ 32.09	33.51
6	29.70	52	„ „ 28.2	„ 32.2	„ 37	„ 31.3	„ 30.80	33.58
7	29.47	55.5	„ „ 24	„ 32.3	„ 36	„ 29.2	„ 29.45	33.63
8	29.40	55	„ „ 26.7	„ 31	„ 38.1	„ 28	„ 28.72	33.66
10	29.72	52	„ „ 28.4	„ 33.3	„ 41.0	„ 32.3	„ 30.66	33.73
12	30.00	40.2	„ „ 28.8	„ 32.8	„ 36.8	„ 33.7	„ 33.89	33.79
13	30.02	49.5	„ „ 28.0	„ 32.8	„ 36	„ 34.2	„ 32.94	33.79
14	29.97	63	„ „ 24.1	„ 33.4	„ 37.7	„ 35.2	„ 29.61	33.80
17	30.03	54	„ „ 23.8	„ 26.0	„ 27.0	„ 30.2	„ 31.45	33.80
18	30.20	52	„ „ 25.2	„ 28.6	„ 32.5	„ 33.0	„ 31.78	33.80
June 5	.5...Mean...		358 39 25.6	39 31.7	39 35.6	39 31.1	1 31.29	33.405
Refract. and Reduct.			−57.9	57.9	57.9	57.9		
			358 38 27.7	38 33.8	38 37.7	38 33.2		

Mean of 4 Microscopes ..... 1° 34′ 41″.82 by 31 Observ.

Mean S. P. D. of τ Octantis, Jan. 1, 1828 . . . . . 1° 34′ 41″.71 by 58 Observ.

34 Octantis. (Ann. Var. — 3″.8409.)

Superior Culmination.

1822.	Barom.	Therm.	Microscopes. I.	II.	III.	IV.	Refr.	Red. +
	inches.	°	° ′ ″	′ ″	′ ″	′ ″	′ ″	″
Sept. 10	29.55	52	0 40 19 58.4	19 18	20 4.5	20 1.5	1 17.83	5.52
11	29.81	53	„ „ 56.3	„ 12.8	„ 9.7	„ 3.6	„ 18.37	5.52
12	30.00	53.5	„ „ 58.6	„ 14.8	„ 3.3	„ 0.0	„ 18.79	5.52
Sept. 11... Mean ...			40 19 57.8	19 15.2	20 5.8	20 1.7	1 18.33	5.52
Refract. and Reduct.			−1 12.8	1 12.8	1 12.8	1 12.8		
Superior Culminat.			40 18 45.0	18 2.4	18 53.0	18 48.9		
Inferior Culminat...			35 32 54.7	32 8.7	33 7.8	32 51.9		
Half Diff. S. P. D.			2 22 55.35	22 56.8	22 52.2	22 58.5		

Inferior Culmination.

1822.	Barom.	Therm.	Microscopes. I.	II.	III.	IV.	Refr.	Red. +
	inches.	°	° ′ ″	′ ″	′ ″	′ ″	′ ″	″
Sept. 11	29.95	39.8	35 34 37	33 51	34 50.1	34 54.2	1 36.8	5.52
Refract. and Reduct.			−1 42.3	1 42.3	1 42.3	1 42.3		
			35 33 54.7	32 8.7	33 7.8	32 51.9		

Mean S. P. D. 34 Octantis, Jan. 1, 1828. . . . } 2° 22′ 55″.65 by 4 Observ.

ζ Octantis. (Ann. Var. — 15″.234.)

Superior Culmination.

1822.	Barom.	Therm.	Microscopes. I.	II.	III.	IV.	Refr.	Red. −
	inches.	°	° ′ ″	′ ″	′ ″	′ ″	′ ″	″
May 27	29.87	58.5	5 1 4 3.5	5 56.2	4 20.3	4 28.7	1 10.6	7.39
Refract. and Reduct.			−2 17.9	2 17.9	2 17.9	2 17.9		
Superior Culminat.			5 1 45.6	1 18.3	2 02.4	2 10.8		
Inferior Culminat...			354 57 26.6	57 20.2	57 42.8	57 41.0		
Half Diff. S. P. D.			5 2 9.5	2 29.05	2 9.8	2 14.9		

Inferior Culmination.

1822.	Barom.	Therm.	Microscopes. I.	II.	III.	IV.	Refr.	Red. +
	inches.	°	° ′ ″	′ ″	′ ″	′ ″	′ ″	″
May 21	29.98	48.3	354 58 4	57 44.3	58 21.5	58 10.5	1 46.2	1 7.52
June 3	29.71	48	354 58 5	58 12	58 20	58 27.5	1 45.2	1 8.02
Mean...			354 58 4.5	57 58.1	58 20.7	58 19.0	1 45.7	1 7.77
Refract. and Reduct.			−37.9	37.9	37.9	38.0		
			354 57 26.6	57 20.2	57 42.8	57 41.0		

Mean S. P. D. of ζ Octantis, Jan. 1, 1828 . . . . . 5° 2′ 15″.8 by 3 Observ.

ϰ Octantis. (Ann. Var. — 18″.97.)

Superior Culmination.

1828.	Barom.	Therm.	Microscopes. I.	II.	III.	IV.
	inches.	°	° ′ ″	′ ″	′ ″	′ ″
July 2	29.84	53	0 20 10.5	20 15	20 11.2	20 20.8
3	29.69	53	„ „ 10	„ 12.5	„ 8.8	„ 21.6
5	30.18	50.5	„ „ 14.9	„ 17.5	„ 12.2	„ 23.7
6	30.16	46	„ „ 15.2	„ 18.0	„ 14.1	„ 26.0
10	29.81	57.5	„ „ 11.0	„ 11.2	„ 11.0	„ 20.4
11	30.03	48.5	„ „ 12.0	„ 15.0	„ 14.8	„ 23.4
12	29.98	50	„ „ 13.2	„ 16.2	„ 14.0	„ 25.2
14	29.95	49	„ „ 13.2	„ 15.0	„ 14.1	„ 25.0
15	30.00	54.7	„ „ 14.0	„ 18.0	„ 14.0	„ 23.2
17	29.65	64	„ „ 12.8	„ 15.0	„ 13	„ 26.7
18	29.87	62	„ „ 9.8	„ 11.7	„ 8.4	„ 20.0
19	29.96	55	„ „ 10.0	„ 13.0	„ 9.5	„ 23.5
July 16... Mean ...			5 20 13	20 16.3	20 14.2	20 24.7
Refract. − Reduct.			− 40.6	40.6	40.6	40.6
Superior Culminat.			5 19 32.4	19 35.7	19 33.6	19 44.1
Inferior Culminat...			355 7 5.6	7 11.0	7 12.6	7 11.6
Half Diff. = S.P.D.			5 6 13.4	6 12.3	6 10.5	6 16.3

Inferior Culmination.

1828.	Barom.	Therm.	Microscopes. I.	II.	III.	IV.
	inches.	°	° ′ ″	′ ″	′ ″	′ ″
July 1	29.85	43.3	355 9 12	9 18	9 20	9 30.5
3	29.72	38.6	„ „ 21	„ 25	„ 26.5	„ 24.0
5	30.23	41	„ „ 20.8	„ 28.3	„ 29.3	„ 27
7	30.05	36.5	„ „ 28	„ 29	„ 32	„ 30.5
13	29.99	33	„ „ 26.9	„ 33.5	„ 32	„ 28
14	29.99	40	„ „ 22.7	„ 28	„ 30.5	„ 30
15	30.02	33	„ „ 25.0	„ 32	„ 31.3	„ 31
17	29.78	54.5	„ „ 19.3	„ 22	„ 26.0	„ 27.1
18	30.00	35	„ „ 22.0	„ 28.2	„ 28.8	„ 29.3
20	29.56	45	„ „ 29.0	„ 37.0	„ 39.5	„ 38.4
July 11...Mean...			355 9 22.6	9 28	9 29.6	9 28.6
Refract. − Reduct.			−2 17.0	2 17.0	2 17.0	2 17.0
			355 7 5.6	7 11	7 12.6	7 11.6

Mean S. P. D. of ϰ Oct. Jan. 1, 1828. } 5° 6′ 13″.12 by 22 Obs.

η Octantis. (Ann. Var. $-19''.33$.)

Superior Culmination.

1823.	Barom.	Therm.	Microscopes. I.	II.	III.	IV.
	inches.	°	° ′ ″	′ ″	′ ″	′ ″
June 14	29.86	56.2	142 19 53	20 42.6	20 45.2	20 18.7
15	29.69	58.0	142 19 54.7	21 2.1	20 49	20 21.0
Mean...			142 19 53.8	20 52.3	20 47.1	20 19.8
Refract. and Reduct.			−2 10.4	2 10.4	2 10.4	2 10.4
Superior Culminat.			142 17 43.4	18 41.9	18 36.7	18 9.4
Inferior Culminat...			129 37 48.3	38 56.0	38 37.1	38 21.6
Half Diff. S. P. D.			6 19 57.5	19 53.0	19 59.8	19 53.9

Inferior Culmination.

1823.	Barom.	Therm.	Microscopes. I.	II.	III.	IV.
	inches.	°	° ′ ″	′ ″	′ ″	′ ″
June 10	30.01	39.2	129 38 39.7	39 47.4	39 28.5	39 13
Refract. and Reduct.			−51.4	51.4	51.4	51.4
			129 37 48.3	38 56.0	38 37.1	38 21.6

Mean of 4 Microscopes.....6° 19′ 56″.05 by 3 Observ.

1828.	Barom.	Therm.	Microscopes. I.	II.	III.	IV.
	inches.	°	° ′ ″	′ ″	′ ″	′ ″
May 24	30.22	56	6 33 38	33 44	33 43	33 51.2
25	30.14	56	„ „ 31	„ 42.3	„ 38.3	„ 44.7
27	39.95	61.7	„ „ 34.7	„ 43.8	„ 42	„ 51.0
28	29.87	56	„ „ 34.2	„ 45.3	„ 44	„ 46.5
29	29.84	48.2	„ „ 38	„ 46.5	„ 41.1	„ 44.7
July 1	30.01	43	„ „ 31.8	„ 43.5	„ 38.0	„ 41.5
2	29.99	50	„ „ 28.5	„ 42	„ 36	„ 44
6	29.70	51	„ „ 36.0	„ 47	„ 43.5	„ 48.8
7	29.47	51	„ „ 30.8	„ 43.3	„ 39.2	„ 42.2
8	29.40	55	„ „ 33.0	„ 45.0	„ 38	„ 47.5
10	29.72	48.5	„ „ 33.8	„ 46.4	„ 46.3	„ 47.0
11	29.76	53	„ „ 36.6	„ 41.8	„ 36.6	„ 48.0
12	30.00	40	„ „ 41.7	„ 46	„ 42.3	„ 53
14	29.97	63	„ „ 36.5	„ 44	„ 38	„ 47
17	30.03	53.7	„ „ 31.6	„ 39.1	„ 36	„ 48
18	30.20	52	„ „ 38.0	„ 43	„ 38	„ 48
June 5	...Mean...		6 33 34.64	33 44	33 40.02	33 47.1
Refract. – Reduct.			−34.63	34.6	34.65	34.8
Superior Culminat.			6 33 0.0	33 9.4	33 5.4	33 12.4
Inferior Culminat...			353 53 22.6	53 29.5	53 29.3	53 20.8
Half Diff. S. P. D.			6 19 48.7	19 50	19 48.05	19 55.8

1828.	Barom.	Therm.	Microscopes. I.	II.	III.	IV.
	inches.	°	° ′ ″	′ ″	′ ″	′ ″
May 29	29.83	35	353 55 43.3	55 55.5	55 57.5	55 40.0
June 6	29.55	38	„ „ 48.0	„ 58.4	55 58.0	55 47.0
7	29.43	39	„ „ 48.0	„ 56.0	55 58.5	55 43.0
9	29.69	50	„ „ 43.3	„ 55	55 51.4	55 39.6
11	29.93	33	„ „ 53.5	„ 59.5	56 1.5	55 53
12	30.05	29	„ „ 56.4	„ 58.5	56 2.0	55 52
16	30.00	38	„ „ 53.0	„ 57.0	56 56	55 51
17	30.13	36	„ „ 50.2	„ 55	56 55	55 49.3
19	30.39	35	„ „ 52	„ 59	56 56.2	55 50
20	30.26	33	„ „ 56	„ 59	56 55.2	56 1.5
June 11,5... Mean...			353 55 50.37	55 57.3	55 57.1	55 48.64
Refract. and Reduct.			−2 27.8	2 27.8	2 27.8	2 27.8
			353 53 22.6	53 29.5	53 29.3	53 20.8

Mean of 4 Microscopes .....6° 19′ 50″.64 by 26 Observ.

Mean S. P. D. of η Octantis, Jan. 1, 1828 . . . . . 6° 19′ 51″.02 by 29 Observ.

For want of room, the columns of Refraction and Reduction have been henceforward omitted; but the sums or differences of their means have been applied to the means of the microscopes, so that the latter corrected means are the divisions of the mural circle corresponding to the superior and inferior culminations of the Star's mean place on the 1st January 1828. These divisions are variable, because the position of the tube is altered and the pillar settles; but their differences are constant quantities.

The second microscope during the years of 1822 and 1823 was subject to frequent derangements, from causes over which I had no control.

3 γ Octantis. (Ann. Var. + 20″.01.)

Superior Culmination.

1827.	Barom.	Therm.	Microscopes. I.	II.	III.	IV.
	inches.	°	° ′ ″	′ ″	′ ″	′ ″
June 17	30.24	40	7 5 27	5 51.3	5 30.0	5 41.0
23	29.84	47	„ „ 21.8	„ 32.0	„ 29.8	„ 44.0
26	30.05	45	„ „ 27.4	„ 33.0	„ 28.0	„ 45
June 21.5...Mean...			7 5 25.4	5 31.3	5 29.3	5 43.3
Refract. and Reduct.			−1 22.60	1 22.7	1 22.7	1 22.7
Superior Culminat.			7 4 2.8	4 8.6	4 6.6	4 20.6
Inferior Culminat...			353 25 53.1	25 56.7	25 50.7	25 57.8
Half Diff. S. P. D.			6 49 4.8	49 6.0	49 8.0	49 11.4

Inferior Culmination.

1827.	Barom.	Therm.	Microscopes. I.	II.	III.	IV.
	inches.	°	° ′ ″	′ ″	′ ″	′ ″
June 18	30.23	46	353 27 32.0	27 35.5	27 27.0	27 36.4
23	29.83	54.5	„ „ 32.7	„ 34.9	„ 30.0	„ 36.3
27	30.01	50	„ „ 31.0	„ 36.1	„ 31.1	„ 37.0
June 22 ...Mean...			353 27 31.9	27 35.5	27 29.4	27 36.6
Refract. and Reduct.			−1 38.80	1 38.8	1 38.7	1 38.8
			353 25 53.1	25 56.7	25 50.7	25 57.8

Mean of 4 Microscopes.....6° 49′ 7″.55 by 6 Observ.

1828.	Barom.	Therm.	Microscopes. I.	II.	III.	IV.
	inches.	°	° ′ ″	′ ″	′ ″	′ ″
June 10	29.71	35.5	7 3 52	4 6.0	4 2.4	4 6.5
11	29.94	33	„ 4 1.5	„ 6.5	4 4.4	„ 11.2
13	30.00	30	„ 4 5.7	„ 12.0	4 4.3	„ 15.0
16	30.00	38	„ 3 55.0	„ 4.5	3 57.7	„ 5.8
17	30.13	36	„ 3 58	„ 7.5	4 2.2	„ 11.7
18	30.39	38.2	„ 4 1.0	„ 3.8	4 1.7	„ 84
19	30.28	36	„ 4 2.8	„ 10.5	4 5.2	„ 11.0
20	30.33	35	„ 4 4.0	„ 9.3	4 1.0	„ 10.0
22	30.21	54.5	„ 3 58.7	„ 4.5	3 58.7	„ 9.0
26	30.30	45	„ 4 0.5	„ 5	4 1.0	„ 11.0
June 17.2...Mean...			7 3 59.92	4 6.96	4 1.9	4 9.96
Refract. and Reduct.			−1 41.78	1 41.78	1 41.8	1 41.78
Superior Culminat.			7 2 18.14	2 25.18	2 20.1	2 28.18
Inferior Culminat...			353 24 5.8	24 7.6	24 5.7	24 7.5
Half Diff. S. P. D.			6 49 6.17	49 8.8	49 7.2	49 19.35

Mean of 4 Microscopes.....6° 49′ 8″.13 by 19 Observ.

1828.	Barom.	Therm.	Microscopes. I.	II.	III.	IV.
	inches.	°	° ′ ″	′ ″	′ ″	′ ″
June 11	29.79	50	353 25 27.7	25 30	25 32	25 35
16	29.81	55	„ „ 24.3	„ 28.5	„ 27.0	„ 28.2
17	30.08	51.5	„ „ 25.2	„ 26	„ 20.5	„ 27.5
18	30.20	49.5	„ „ 30	„ 33	„ 29	„ 31.0
19	30.34	49.5	„ „ 30	„ 33.7	„ 31.0	„ 30.7
20	30.27	52	„ „ 26.3	„ 30.5	„ 27	„ 28
26	30.22	.....	„ „ 20	„ 19.3	„ 17.2	„ 18.2
July 1	29.75	59	„ „ 25	„ 26.2	„ 25.2	„ 26.1
2	29.84	55	„ „ 31.7	„ 30	„ 31.0	„ 32.3
June 21... Mean ...			353 25 26.7	25 28.6	25 26.6	25 28.5
Refract. and Reduct.			−1 20.9	−1 21.0	−1 20.9	−1 21.0
			353 24 5.8	24 7.6	24 5.7	24 7.5

Mean S. P. D. of 3 γ Octantis . . . . . 6° 49′ 7″.99 by 25 Observ.

2 γ Octantis.

Superior Culmination.

1827.	Barom.	Therm.	Microscopes. I.	II.	III.	IV.
	inches.	°	° ′ ″	′ ″	′ ″	′ ″
June 17	30.24	40	7 8 41.3	8 47.4	8 44.8	8 57.7
23	29.85	47	„ „ 39.5	„ 44.0	„ 40.0	8 58.7
26	30.05	45	„ „ 43.3	„ 50.0	„ 45.0	9 4.0
June 21-5... Mean...			7 8 41.4	8 47.1	8 43.3	9 0.1
Refract. + Reduct.			−1 23.2	1 23.3	1 23.2	1 23.3
Superior Culminat.			7 7 18.2	7 23.8	7 20.1	7 36.8
Inferior Culminat...			353 22 35.0	22 39.7	22 36.3	22 42.5
Mean S. P. D.			6 52 21.6	52 22.05	52 21.9	52 27.15

Inferior Culmination.

1827.	Barom.	Therm.	Microscopes. I.	II.	III.	IV.
	inches.	°	° ′ ″	′ ″	′ ″	′ ″
June 18	30.23	48	353 24 14.0	24 18.5	24 16.3	24 31.7
23	29.83	54.5	„ 24 14.0	„ 16.0	„ 16.0	„ 22.0
27	30.01	50.0	„ 24 14.3	„ 21.2	„ 14.2	„ 31.7
June 22... Mean...			353 24 14.2	24 18.9	24 15.5	24 21.8
Refract. and Reduct.			−1 39.2	1 39.2	1 39.2	1 39.3
			353 22 35.0	22 39.7	22 36.3	22 42.5
Mean of 4 Microscopes, Jan. 1, 1828...6° 52′ 23″.2 by 6 Observ.						

1828.	Barom.	Therm.	Microscopes. I.	II.	III.	IV.
	inches.	°	° ′ ″	′ ″	′ ″	′ ″
June 10	29.71	55.5	7 7 11.2	7 23.8	7 22.5	7 19
11	29.94	33	„ „ 14.4	„ 21.4	„ 96	„ 20.8
12	30.05	29	„ „ 12.0	„ 21.7	„ 19.2	„ 22
13	30.00	31	„ „ 23.0	„ 26.8	„ 22.0	„ 30.5
16	30.00	38	„ „ 13.	„ 18	„ 14.3	„ 20.0
17	30.13	36	„ „ 17.5	„ 18.2	„ 17.3	„ 22
18	30.32	38	„ „ 10.5	„ 18.0	„ 17.2	„ 21.5
19	30.33	35	„ „ 16.2	„ 23.0	„ 21.2	„ 22.8
21	30.27	37	„ „ 20.4	„ 24.2	„ 17.0	„ 27.0
22	30.21	54.5	„ „ 15.2	„ 18.7	„ 17.0	„ 23.2
June 16... Mean...			7 7 15.34	7 21.4	7 19.4	7 22.9
Refract. + Reduct.			−1 43.23	1 43.2	1 43.2	1 43.3
Superior Culminat.			7 5 32.1	5 38.2	5 36.2	5 39.6
Inferior Culminat...			353 20 51.1	20 53.6	20 54.6	20 48.4
Half Diff. S. P. D.			6 52 20.5	52 21.3	52 20.8	52 25.6

1828.	Barom.	Therm.	Microscopes. I.	II.	III.	IV.
	inches.	°	° ′ ″	′ ″	′ ″	′ ″
June 11	29.79	50	353 22 13.1	22 14.0	22 15.5	22 11.6
13	30.02	42	„ „ 17.5	„ 18.7	„ 22.5	„ 15.0
17	30.03	52	„ „ 9.3	„ 14.0	„ 13.0	„ 5.6
18	30.20	49.5	„ „ 10.0	„ 16.5	„ 16.0	„ 11.0
19	30.34	49.5	„ „ 14.2	„ 16	„ 18	„ 11.5
20	30.27	52	„ „ 11.2	„ 14.2	„ 14.5	„ 6.
22	30.15	68	„ „ 12.7	„ 14.0	„ 13.0	
26	30.22	61.5	„ „ 10.0	„ 10.0	„ 14.6	„ 6.1
June 18... Mean...			353 22 12.3	22 14.7	22 15.8	22 9.1
Refract. − Reduct.			−1 21.15	1 21.1	1 21.2	1 21.1
			353 20 51.15	20 53.6	20 54.6	20 48.4
Mean of 4 Microscopes.....6° 52′ 22″.05 by 18 Observ.						

Mean S. P. D. of 2 γ Octantis, Jan. 1, 1828 . . . . . 6° 52′ 22″.32 by 24 Observ.

1 γ Octantis. (Ann. Var. + 19″.94.)

Superior Culmination.

1827.	Barom.	Therm.	Microscopes. I.	II.	III.	IV.
	inches.	°	° ′ ″	′ ″	′ ″	′ ″
June 23	29.84	47	7 17 39	17 46.5	17 40	17 58
26	30.05	45	7 17 46	17 51.3	17 50.4	18 5
June 24.5...Mean...			7 17 42.5	17 48.9	17 45.2	18 1.5
Refract. + Reduct.			−1 22.0	1 22.0	1 22.0	1 22.0
Superior Culminat.			7 16 20.5	16 26.9	16 23.2	16 39.5
Inferior Culminat...			353 13 26.5	13 31.2	13 32.2	13 31.1
Half Diff. S. P. D.			7 1 27.0	1 27.85	1 25.5	1 34.2

Inferior Culmination.

1827.	Barom.	Therm.	Microscopes. I.	II.	III.	IV.
	inches.	°	° ′ ″	′ ″	′ ″	′ ″
June 18	30.332	46	353 15 7.5	15 13.5	15 9.3	15 14
27	30.01	50	353 15 8.4	15 12.0	15 18.0	15 11.1
June 22.5...Mean...			353 15 8.0	15 12.7	15 13.68	15 12.6
Refract. − Reduct.			−1 41.5	1 41.5	1 41.47	1 41.5
			353 13 26.5	13 31.2	13 32.21	13 31.1

Mean of 4 Microscopes ..... 7° 1′ 28″.64 by 4 Observ.

1828.	Barom.	Therm.	Microscopes. I.	II.	III.	IV.
	inches.	°	° ′ ″	′ ″	′ ″	′ ″
June 10	29.71	35.5	7 16 19.5	16 28	16 25.5	16 28.5
12	30.05	29	„ „ 21.0	„ 30	„ 27.7	„ 32.7
13	30.00	31	„ „ 28.7	„ 30	„ 25.8	„ 35.0
16	30.00	38	„ „ 18.0	„ 25	„ 23	„ 31.0
17	30.13	36	„ „ 20.0	„ 26.5	„ 27	„ 32.0
18	30.32	38.2	„ „ 21.7	„ 27.4	„ 25	„ 32
19	30.33	35	„ „ 26.7	„ 28.1	„ 28.2	„ 37
20	30.26	34	„ „ 25.0	„ 25.8	„ 26	„ 31.1
21	30.27	37.2	„ „ 25.0	„ 28.0	„ 26.6	„ 34.1
22	30.21	54.5	„ „ 18.0	„ 16.4	„ 18.5	„ 28.5
29	30.13	49	„ „ 12.2	„ 19.0	„ 16.0	„ 25.2
June 18.... Mean ...			7 16 21.4	16 25.8	16 24.5	16 31.5
Refract. and Reduct.			−1 41.9	1 42.0	1 41.9	1 42.0
Superior Culminat.			7 14 39.5	14 43.8	14 42.6	14 49.5
Inferior Culminat...			353 11 45.8	11 45.8	11 40.4	11 43.4
Half Diff. S. P. D.			7 1 26.8	1 29.0	1 31.1	1 33.1

1828.	Barom.	Therm.	Microscopes. I.	II.	III.	IV.
	inches.	°	° ′ ″	′ ″	′ ″	′ ″
June 11	29.79	50	353 13 8.3	13 6.5	13 3	13 5.8
13	30.02	42	„ 13 16.0	„ 12.5	13 1.0	„ 11.0
14	29.97	63	„ 13 5.0	„ 7.4	13 3.7	„ 1.3
			„ 13 12.6	„ 14.8	13 11.45	„ 16.5
17	30.03	52	„ 1 3.0	„ 3.2	12 57.0	„ 3.4
18	30.20	50	„ 1 1.8	„ 6.7	13 1.0	„ 4.0
19	30.34	49.5	„ 0 7.5	„ 9.2	13 5.5	„ 7.0
20	30.27	52	„ 0 7.0	„ 9.7	13 1.0	„ 5.0
22	30.15	68	„ 0 6.5	„ 6.5	13 2.5	„ 5.0
26	30.25	57	„ 0 8.5	„ 3.2	13 1.0	„ 1.0
June 18.... Mean ...			353 13 7.1	13 7.2	13 1.7	13 4.8
Refract. and Reduct.			−1 21.3	1 21.4	1 21.3	1 21.4
			353 11 45.8	11 45.8	11 40.4	11 43.4

Mean of 4 Microscopes ..... 7° 1′ 30″.0 by 21 Observ.

Mean S. P. D. of 1 γ Octantis, Jan. 1, 1828 . . . . . 7° 1′ 29″.77 by 25 Observ.

δ Octantis. (Ann. Var. − 17″.329.)

Superior Culmination.

1822.	Barom.	Therm.	Microscopes. I.	II.	III.	IV.
	inches.	°	′ ″	′ ″	′ ″	′ ″
July 28	29.83	50.8	45 6 12.4	6 4	6 1.5	6 3.2
30	29.95	50.8	45 6 0.0	6 1	5 56.5	5 58.7
31	30.07	54.0	45 6 2.5	5 59	5 54.3	6 2.5
July 30	... Mean...		45 6 4.9	6 1.3	5 57.8	6 1.5
Refract.	+ Reduct.		−2 13.9	2 14.0	2 13.9	2 14.0
Superior	Culminat.		45 3 51.0	3 47.3	3 43.9	3 47.5
Inferior	Culminat...		30 47 48.4	47 51.3	47 57.4	47 56.3
Half.	Diff. S. P. D.		7 8 1.3	7 58.0	7 53.25	7 55.6

Inferior Culmination.

1822.	Barom.	Therm.	Microscopes. I.	II.	III.	IV.
	inches.	°	° ′ ″	° ′ ″	° ′ ″	° ′ ″
July 28	29.87	46.3	30 48 42.6	48 37	48 41.6	48 40
30	30.03	41.8	„ „ 40	„ 47.0	„ 51.0	„ 47.0
31	30.20	45	„ „ 36.3	„ 40.3	„ 47.0	„ 48.0
Aug. 15	30.14	43.5	„ „ 33.0	„ 39.7	„ 48	„ 48
Aug. 3	... Mean ...		30 48 38	48 41.0	48 47	48 46
Refract.	− Reduct.		−49.6	49.7	49.6	49.7
			30 47 48.4	47 51.3	47 57.4	47 56.3

Mean of 4 Microscopes..... 7° 7′ 57″.04 by 7 Observ.

1826.	Barom.	Therm.	Microscopes. I.	II.	III.	IV.
	inches.	°	° ′ ″	′ ″	′ ″	′ ″
July 18	30.09	40	7 50 2.1	49 52	49 41	49 58.5
28	30.03	46	„ 49 58.2	„ 50.7	„ 48.5	„ 56.3
29	30.27	48	„ 49 54.0	„ 50.6	„ 46.4	„ 55.0
31	30.30	50	„ 50 0.5	„ 51.5	„ 48.5	„ 57.0
Aug. 2	30.12	52.5	„ 49 59	„ 48	„ 43	„ 56.1
July 27.8	...Mean...		7 49 58.8	49 50.6	49 45.3	49 56.6
Refract.	+ Reduct.		−1 10.5	1 10.5	1 10.5	1 10.5
Superior	Culminat.		7 48 48.3	48 40.1	48 35.0	48 46.1
Inferior	Culminat...		353 32 53.2	32 55.8	32 48.9	32 57.2
Half.	Diff. S. P. D.		7 7 57.5	7 52.2	7 53.0	7 54.5

1826.	Barom.	Therm.	Microscopes. I.	II.	III.	IV.
	inches.	°	° ′ ″	′ ″	′ ″	′ ″
July 13	30.15	31.8	353 34 55	34 54.5	34 44.2	34 57
14	30.17	31.0	„ „ 39	„ 50.0	„ 48.5	„ 53
17	30.12	31	„ „ 48	„ 54.0	„ 43.4	„ 54.5
24	30.01	37	„ „ 49	„ 51.0	„ 43.0	„ 50.0
27	29.97	43	„ „ 48.5	„ 47.7	„ 43.3	„ 50.5
29	30.31	37	„ „ 48.0	„ 52	„ 44.0	„ 52.0
31	30.11	34	„ „ 55.0	„ 55	„ 46	„ 56.2
Aug. 4	30.06	33	„ „ 53.7	„ 53	„ 49	„ 54.2
July 24	... Mean ...		353 34 49.5	34 52.1	34 45.2	34 53.4
Refract.	− Reduct.		−1 56.3	1 56.3	1 56.3	1 56.2
			353 32 53.2	32 55.8	32 48.9	32 57.2

Mean of 4 Microscopes.....7° 7′ 54″.29 by 13 Observ.

δ Octantis. (Ann. Var. — 17″.329.)—(Continued.)

Superior Culmination.

1827.	Barom.	Therm.	Microscopes. I.	II.	III.	IV.
	inches.		° ′ ″	′ ″	′ ″	′ ″
May 25	30.104	52	7 23 37	23 56.7	23 52.5	24 14.0
27	30.130	48.5	„ „ 45.7	23 58.3	24 0.4	„ 12.0
June 1	30.30	49	„ „ 46.0	24 1.5	24 5.0	„ 12.0
2	30.21	48	„ „ 44.5	24 0.0	24 3.0	„ 19.0
7	30.13	48.5	„ „ 41.0	23 50.0	23 56.7	„ 14.0
29	29.93	40.0	„ „ 46.2	23 58.2	23 56.5	„ 11.2
July 4	30.34	48	„ „ 43.3	23 54.5	23 56.3	„ 14.0
10	30.15	52	„ „ 41.0	23 55	23 53.7	„ 12.0
18	29.93	47.5	„ „ 39.0	23 53.0	23 49.0	„ 9.2
June 17	... Mean ...		7 23 42.63	23 56.4	23 57.0	24 13.04
	Refract. — Reduct.		—1 0.53	1 0.5	1 0.5	1 0.53
	Superior Culminat.		7 22 42.10	22 55.9	22 56.5	23 12.51
	Inferior Culminat.		353 7 05.0	7 9.4	7 8.5	7 9.40
	Half Diff. S. P. D.		7 7 48.55	7 53.2	7 54.0	8 1.5

Inferior Culmination.

1827.	Barom.	Therm.	Microscopes. I.	II.	III.	IV.
	inches.		° ′ ″	′ ″	′ ″	′ ″
July 7	30.333	47	353 9 16	9 20.0	9 15	9 20
9	30.27	48	„ „ 14	„ 18.0	„ 18	„ 18.5
12	30.02	44	„ „ 14	„ 18.4	„ 16.2	„ 17.0
15	29.69	39	„ „ 11	„ 13.3	„ 12.0	„ 15
17	29.90	56	„ „ 14.7	„ 20.5	„ 16.7	„ 19
19	29.90	39.5	„ „ 8.3	„ 15.0	„ 19.0	„ 16.7
July 13	... Mean ...		353 9 13.0	9 17.5	9 16.5	9 17.5
	Refract. + Reduct.		—2 8.0	2 8.1	2 8.0	2 8.1
			353 7 05.0	7 9.4	7 8.5	7 9.4

Mean of 4 Microscopes.....7° 7′ 54″.34 by 15 Observ.

1827.	Barom.	Therm.	Microscopes. I.	II.	III.	IV.
	inches.		° ′ ″	′ ″	′ ″	′ ″
July 28	30.25	49.5	7 23 37	23 49.7	24 1.0	23 49
30	30.01	45	„ „ 37	„ 50.0	23 50.5	24 7
Aug. 1	30.10	42	„ „ 38	„ 52.0	23 47.0	24 3
July 30	... Mean ...		7 23 37.3	23 50.6	23 52.8	23 59.7
	Refract. — Reduct.		— 55.9	55.9	55.9	55.9
	Superior Culminat.		7 22 41.4	22 54.7	22 56.9	23 3.8
	Inferior Culminat.		353 7 2.3	7 7.3	7 4.9	7 5.7
	Half Diff. S. P. D.		7 7 49.55	7 53.7	7 56.0	7 59.05

1827.	Barom.	Therm.	Microscopes. I.	II.	III.	IV.
	inches.		° ′ ″	′ ″	′ ″	′ ″
July 27	30.29	39	353 9 13	9 19	9 14	9 15
31	30.04	49	„ „ 19	„ 14	„ 11	„ 13.8
Aug. 1	30.08	32	„ „ 14	„ 18.9	„ 20.3	„ 18.0
17	30.102	36.5	„ „ 11	„ 18.0	„ 15	„ 16.8
Aug. 6	... Mean ...		353 9 12.5	9 17.5	9 15.1	9 15.9
	Refract. and Reduct.		—2 10.2	2 10.2	2 10.2	2 10.2
			353 7 2.3	7 7.3	7 4.9	7 5.7

Mean of 4 Microscopes.....7° 7′ 54″.58 by 7 Observ.

1828.	Barom.	Therm.	Microscopes. I.	II.	III.	IV.
	inches.		° ′ ″	′ ″	′ ″	′ ″
June 27	30.25	57.0	7 21 49	21 48.5	21 48	21 58
28	30.222	56.0	„ „ 48	„ 50.0	„ 43	21 59
July 3	29.69	53	„ „ 56	„ 54	„ 51.7	22 2
12	29.98	49.3	„ „ 56.3	„ 56	„ 51.5	22 3
16	29.83	57	„ „ 55.0	„ 56.5	„ 53.2	22 7.3
17	29.65	63	„ „ 54.0	„ 53	„ 51.3	22 5.0
18	29.87	59	„ „ 55	„ 54	„ 49	22 4.0
19	29.95	53	„ „ 52.2	„ 52.3	„ 47.7	22 3.8
July 10	... Mean ...		7 21 53.2	21 53.04	21 49.4	22 2.8
	Refract. — Reduct.		—39.6	39.63	39.6	39.7
	Superior Culminat.		7 21 13.6	21 13.4	21 9.8	21 23.1
	Inferior Culminat...		353 5 27.7	5 28.0	5 23.8	5 25.6
	Half. Diff. S. P. D.		7 7 52.9	7 52.7	7 53.0	7 58.8

1828.	Barom.	Therm.	Microscopes. I.	II.	III.	IV.
	inches.		° ′ ″	′ ″	′ ″	′ ″
July 12	29.93	57.5	353 7 51	7 53	7 50.2	7 51.2
13	29.91	32	„ „ 58	„ 52.7	„ 50.0	„ 49.0
15	30.02	39	„ „ 53	„ 54.0	„ 49.2	„ 51.0
17	29.78	54.5	„ „ 44	„ 47.1	„ 41.2	„ 43.0
18	30.00	36.5	„ „ 51.8	„ 52.7	„ 46.2	„ 51.8
July 15	... Mean ...		353 7 51.3	7 51.6	7 47.4	7 49.2
	Refract. and Reduct.		—2 23.6	2 23.6	2 23.6	2 23.6
			353 5 27.7	5 28.0	5 23.8	5 25.6

Mean of 4 Microscopes.....7° 7′ 54″.35 by 13 Observ.

δ Octantis. (Ann. Var. — 17″.329.)—(Continued.)

Superior Culmination.

1828.	Barom.	Therm.	Microscopes. I.	II.	III.	IV.
	inches.	°	° ′ ″	′ ″	′ ″	′ ″
July 21	29.59	50	7 22 11.1	22 9.3	22 8.3	22 20
22	29.73	50	„ „ 12.1	„ 12.2	„ 8.7	„ 23.2
23	30.00	55	„ „ 14.0	„ 14.0	„ 10.3	„ 24.1
24	30.07	51	„ „ 15	„ 15.0	„ 7.7	„ 26
26	30.20	53	„ „ 17.3	„ 18.4	„ 17.3	„ 30
July 23.5... Mean...			7 22 13.9	22 13.8	22 10.5	22 24.7
Refract. and Reduct.			−39.6	39.6	39.6	39.6
Superior Culminat.			7 21 34.3	21 34.2	21 30.9	21 45.1
Inferior Culminat...			353 5 46.1	5 48.8	5 43.1	5 45.4
Half Diff. S. P. D.			7 7 54.1	7 52.7	7 53.9	7 59.8

Inferior Culmination.

1828.	Barom.	Therm.	Microscopes. I.	II.	III.	IV.
	inches.	°	° ′ ″	′ ″	′ ″	′ ″
July 22	29.81	45.5	353 8 9.2	8 8.3	8 2.0	8 6
24	30.03	35.5	„ „ 9.2	„ 13.0	„ 7.0	„ 9
25	30.14	35.0	„ „ 13.5	„ 15.4	„ 10.0	„ 12.0
26	30.29	35.5	„ „ 12.0	„ 18.0	„ 13.0	„ 14.0
July 24.4... Mean...			353 8 11.0	8 13.7	8 8.0	8 10.3
Refract. and Reduct.			−2 24.9	2 24.9	2 24.9	2 24.9
			353 5 46.1	5 48.8	5 43.1	5 45.4

Mean of 4 Microscopes.....7° 7′ 55″.12 by 9 Observ.

Superior Culmination.

1828.	Barom.	Therm.	Microscopes. I.	II.	III.	IV.
	inches.	°	° ′ ″	′ ″	′ ″	′ ″
July 29	30.00	53	7 22 12.0	22 18	22 13	22 26.7
30	30.12	45	„ „ 17.0	„ 15.7	„ 17.0	„ 29.0
31	30.23	50.5	„ „ 18.6	„ 19.0	„ 17.8	„ 30.5
Aug. 1	30.20	54	„ „ 19.0	„ 21.0	„ 15.4	„ 29.4
2	30.18	52	„ „ 17.9	„ 16.4	„ 15.0	„ 27.4
3	30.18	52.5	„ „ 18.0	„ 17.8	„ 13.5	„ 31.0
July 31.5... Mean...			7 22 17.1	22 18.0	22 15.3	22 29
Refract. and Reduct.			−39.7	39.7	39.7	39.7
Superior Culminat.			7 21 37.4	21 38.3	21 35.6	21 49.3
Inferior Culminat...			353 5 52.0	5 53.7	5 49.0	5 48.5
Half Diff. S. P. D.			7 7 52.7	7 52.3	7 53.3	8 0.4

Inferior Culmination.

1828.	Barom.	Therm.	Microscopes. I.	II.	III.	IV.
	inches.	°	° ′ ″	′ ″	′ ″	′ ″
July 29	29.95	57	353 8 17.0	8 15.7	8 12.0	8 10
Aug. 1	30.24	37	„ „ 16.0	„ 17.5	„ 13.0	„ 12.2
2	30.18	37.0	„ „ 17.3	„ 17.3	„ 15.2	„ 12.7
3	30.18	37	„ „ 19.0	„ 20.0	„ 10.8	„ 15.5
4	30.17	32	„ „ 19.5	„ 26.7	„ 21.5	„ 20.5
8	30.00	35	„ „ 15.0	„ 16.7	„ 13.3	„ 12.0
Aug. 2.7... Mean...			353 8 17.3	8 19.0	8 14.3	8 13.8
Refract. and Reduct.			−2 25.3	2 25.3	2 25.3	2 25.3
			353 5 52.0	5 53.7	5 49.0	5 48.5

Mean of 4 Microscopes .....7° 7′ 54″.7 by 12 Observ.

Mean S. P. D. of δ Octantis, Jan. 1, 1828 . . . . . 7° 7′ 54″.77 by 76 Observ.

π Octantis. (Ann. Var. — 15″.67.)

Superior Culmination.

1822.	Barom.	Therm.	Microscopes. I.	II.	III.	IV.
	inches.	°	° ′ ″	′ ″	′ ″	′ ″
Aug. 7	30.184	57.7	45 38 3	37 59	37 53.3	38 2.7
Refract. and Reduct.			−2 3.1	2 3.1	2 3.1	2 3.1
Superior Culminat.			45 35 59.9	35 55.9	35 50.3	35 59.6
Inferior Culminat...			30 15 43.9	15 49.3	15 53.0	15 49.7
Half Diff. S. P. D.			7 40 8.0	40 3.3	39 58.6	40 5.0

Inferior Culmination.

1822.	Barom.	Therm.	Microscopes. I.	II.	III.	IV.
	inches.	°	° ′ ″	′ ″	′ ″	′ ″
Aug. 7	30.276	46	30 16 46.8	16 46.6	16 56	16 46.3
10	30.176	46	„ „ 42.7	„ 52	17 0.6	„ 57.0
11	30.022	41.5	„ „ 45.0	„ 50.2	16 55.0	„ 52
12	29.90	38.7	„ „ 49	„ 57.0	16 58.5	„ 52
Aug. 10... Mean ...			30 16 45.9	16 51.4	16 55.0	16 51.8
Refract. — Reduct.			−1 2.0	1 2.1	1 2.0	1 2.1
			30 15 43.9	15 49.3	15 53.0	15 49.7

Mean S. P. D. of π Octantis, Jan. 1, 1828 . . . . . 7° 40′ 3″.7 by 5 Observ.

β Octantis. (Ann. Var. — 18″.42.)

Superior Culmination.

1823.	Barom.	Therm.	Microscopes. I.	II.	III.	IV.
	inches.	°	° ′ ″	′ ″	′ ″	′ ″
June 2	29.98	43.7	143 41 8	42 9.3	42 5.8	41 36.3
Refract. — Reduct.			−3.4	3.4	3.4	3.4
Superior Culminat.			143 41 4.6	42 5.9	42 2.4	41 32.9
Inferior Culminat...			128 14 24.0	15 42.1	15 13.5	14 54.8
Half Diff. S. P. D.			7 43 20.3	43 11.9	43 24.4	43 19.1

Inferior Culmination.

1823.	Barom.	Therm.	Microscopes. I.	II.	III.	IV.
	inches.	°	° ′ ″	′ ″	′ ″	′ ″
June 9	29.71	61.2	128 17 19.6	18 31.2	18 6.7	17 52
15	29.69	65	128 17 17.2	18 42.0	18 9.2	17 46.6
June 12... Mean ...			128 17 18.4	18 36.6	18 7.9	17 49.3
Refract. and Reduct.			−2 54.4	2 54.5	2 54.4	2 54.5
			128 14 24.0	15 42.1	15 13.5	14 54.8

Mean of 4 Microscopes.....7° 43′ 18″.92 by 3 Observ.

Superior Culmination.

1826.	Barom.	Therm.	Microscopes. I.	II.	III.	IV.
	inches.	°	° ′ ″	′ ″	′ ″	′ ″
June 8	29.91	56.5	8 25 6	25 6.5	25 2.5	25 15.6
9	29.97	35	„ „ 13	„ 12.7	24 55.5	„ 11.5
13	30.20	32.5	„ „ 9.1	„ 12.7	25 12.8	„ 21
17	29.85	45.0	„ „ 11.0	„ 8.0	25 1.0	„ 18.3
19	30.01	41.0	„ „ 12.7	„ 3.6	25 0.0	„ 15.6
June 13.2... Mean...			8 25 10.4	25 8.7	25 2.4	25 16.4
Refract. and Reduct.			−1 5.2	1 5.3	1 5.2	1 5.3
Superior Culminat.			8 24 5.2	24 3.4	23 57.2	24 11.1
Inferior Culminat...			352 57 27.2	57 26.7	57 24.3	57 26.8
Half Diff. S. P. D.			7 43 19.0	43 18.3	43 16.5	43 22.1

Inferior Culmination.

1826.	Barom.	Therm.	Microscopes. I.	II.	III.	IV.
	inches.	°	° ′ ″	′ ″	′ ″	′ ″
June 7	29.73	59.5	352 59 29.5	59 23.9	59 24.9	59 25.0
8	29.89	53	„ „ 25.0	„ 26.5	„ 16.6	„ 21.6
9	29.92	51	„ „ 27.0	„ 23.0	„ 27.0	„ 22.6
10	30.03	51	„ „ 27.5	„ 30	„ 28.5	„ 29.5
11	30.09	48	„ „ 23.3	„ 21	„ 22.1	„ 27.0
14	30.18	47	„ „ 29.0	„ 34.5	„ 25.0	„ 34.0
June 10... Mean ...			352 59 26.9	59 26.5	59 24.0	59 26.6
Refract. and Reduct.			−1 59.7	1 59.8	1 59.7	1 59.8
			352 57 27.2	57 26.7	57 24.3	57 26.8

Mean of 4 Microscopes.....7° 43′ 18″.99 by 11 Observ.

β Octantis. (Ann. Var. — 18″.42.)—(Continued.)

Superior Culmination.

1827.	Barom.	Therm.	Microscopes. I.	II.	III.	IV.
	inches.	°	° ′ ″	′ ″	′ ″	′ ″
May 23	30.185	51	7 59 32.3	59 34.1	59 34.0	59 45.7
24	30.18	49	„ „ 34.0	„ 34.8	„ 36.2	„ 49.0
25	30.135	45	„ „ 34.2	„ 37.0	„ 34.0	„ 47.4
27	30.140	48	„ „ 31.1	„ 33.8	„ 34.1	„ 45.0
31	30.33	45	„ „ 33.0	„ 40.7	„ 41.2	„ 47.4
June 1	30.27	40.3	„ „ 34.0	„ 37.7	„ 40.0	„ 48.7
2	30.17	40.0	„ „ 33.7	„ 38.8	„ 39.6	„ 51.1
7	30.10	46.5	„ „ 32.0	„ 36.8	„ 38.0	„ 50.5
12	30.02	44	„ „ 37.5	„ 39.5	„ 40.8	„ 41.2
13	29.85	39.7	„ „ 40.3	„ 42.7	„ 44.0	„ 55.1
June 4	... Mean ...		7 59 34.2	59 37.6	59 38.2	59 48.1
Refract. and Reduct.			−1 22.2	1 22.3	1 22.2	1 22.3
Superior Culminat.			7 58 12.0	58 15.3	58 16.0	58 25.8
Inferior Culminat...			352 31 41.3	31 43.9	31 48.1	31 50.4
Half Diff. S. P. D.			7 43 15.4	43 15.7	43 13.9	43 17.7

Inferior Culmination.

1827.	Barom.	Therm.	Microscopes. I.	II.	III.	IV.
	inches.	°	° ′ ″	′ ″	′ ″	′ ″
May 23	30.14	60	352 33 22	33 21.5	33 26.7	33 32
24	30.13	60	„ „ 19.3	„ 23.7	„ 25.5	„ 29
25	30.10	58.2	„ „ 23	„ 24.0	„ 30.0	„ 30
30	30.18	58	„ „ 18.7	„ 18.5	„ 24	„ 28.5
June 1	30.32	58.5	„ „ 21.7	„ 22.3	„ 26.5	„ 28.6
2	30.20	55	„ „ 21.0	„ 25.0	„ 28.5	„ 31.0
12	30.27	51	„ „ 21.5	„ 27.7	„ 33.0	„ 31.0
14	30.18	57	„ „ 20.0	„ 25.0	„ 27.5	„ 30.0
June 1	... Mean ...		352 33 20.9	33 23.5	33 27.7	33 30.0
Refract. and Reduct.			−1 39.6	1 39.6	1 39.6	1 39.6
			352 31 41.3	31 43.9	31 48.1	31 50.4

Mean of 4 Microscopes.....7° 43′ 15″.7 by 18 Observ.

Superior Culmination.

1827.	Barom.	Therm.	Microscopes. I.	II.	III.	IV.
	inches.	°	° ′ ″	′ ″	′ ″	′ ″
May 16	30.00	52	7 59 33	59 33	59 32.5	59 46
19	30.05	40	„ „ 38	„ 38	„ 42	„ 53
22	30.08	46.5	„ „ 33	„ 34.7	„ 38.8	„ 46
May 19	... Mean ...		7 59 34.7	59 35.2	59 37.8	59 48.3
Refract. and Reduct.			−1 20.6	1 20.6	1 20.6	1 20.6
Superior Culminat.			7 58 14.1	58 14.6	58 17.2	58 27.7
Inferior Culminat...			352 31 36.1	31 41.5	31 41.1	31 34.0
Half Diff. S. P. D.			7 43 19	43 15.05	43 18.05	43 26.8

Inferior Culmination.

1827.	Barom.	Therm.	Microscopes. I.	II.	III.	IV.
	inches.	°	° ′ ″	′ ″	′ ″	′ ″
Apr. 24	30.33	59	352 33 22.5	33 32.1	33 28	33 15
29	30.08	56.5	„ „ 19.3	„ 33.0	„ 22	„ 4
May 2	29.78	55.0	„ „ 25.6	„ 24.0	„ 17.7	„ 17
3	29.86	57	„ „ 19.0	„ 27.0	„ 28.0	„ 5
4	29.91	51	„ „ 21.3	„ 28.5	„ 23.0	„ 7
5	29.98	54	„ „ 24.1	„ 25.5	„ 25.6	„ 8.3
6	30.09	57	„ „ 21.7	„ 23.5	„ 27.0	„ 11.0
9	30.09	62.5	„ „ 16.5	„ 23	„ 22.0	„ 27.0
16	30.01	56	„ „ 17.0	„ 21.7	„ 25.0	„ 26.5
19	30.00	51	„ „ 16.3	„ 20.4	„ 27.5	„ 28.5
20	30.01	52.5	„ „ 18.7	„ 27.3	„ 28.2	„ 28.2
21	30.13	55	„ „ 18.3	„ 24.7	„ 26.1	„ 27.2
22	30.10	55	„ „ 19.9	„ 20.6	„ 25.0	„ 28.7
May 9	... Mean ...		352 33 20.01	33 25.48	33 25.01	33 17.95
Refract. and Reduct.			−1 43.9	1 43.94	1 43.9	1 43.94
			352 31 36.1	31 41.54	31 41.1	31 34.01

Mean of 4 Microscopes.....7° 43′ 19″.74 by 16 Observ.

β Octantis. (Ann. Var. — 18″.42.)—(Continued.)

Superior Culmination.

1828.	Barom.	Therm.	Microscopes. I.	II.	III.	IV.
	inches.	°	° ′ ″	° ′ ″	° ′ ″	° ′ ″
May 12	29.80	72	7 58 7.1	58 9.0	58 5.1	58 15.0
14	29.925	49.5	„ „ 5.0	„ 11.7	„ 6.4	„ 9.0
18	30.222	35	„ „ 13.4	„ 15.8	„ 16.0	„ 16.1
19	30.40	36	„ „ 11.1	„ 15.0	„ 22	„ 17.0
20	30.39	46	„ „ 9.0	„ 13.4	„ 15.7	„ 13.0
23	30.27	47.2	„ „ 8.0	„ 13.5	„ 12.4	„ 14.2
24	30.23	45.5	„ „ 13.5	„ 16.3	„ 9.3	„ 20.2
May 18.5...Mean...			7 58 9.6	58 13.5	58 12.4	58 15.0
Refract. and Reduct.			−1 38.4	1 38.4	1 38.4	1 38.4
Superior Culminat.			7 56 31.2	56 35.1	56 34.0	56 36.6
Inferior Culminat...			352 29 56.9	30 0.5	30 1.5	29 48.6
Half Diff. S. P. D.			7 43 17.15	43 17.3	43 16.7	43 24.0

Inferior Culmination.

1828.	Barom.	Therm.	Microscopes. I.	II.	III.	IV.
	inches.	°	° ′ ″	° ′ ″	° ′ ″	° ′ ″
May 13	29.78	66	352 31 25	31 28.4	31 27.7	31 30
14	29.88	66	„ „ 24.8	„ 28.5	„ 26.0	„ 17.0
15	29.99	58.2	„ „ 22.4	„ 24.9	„ 28.0	„ 13
16	30.05	50.3	„ „ 21.8	„ 25.0	„ 25.5	„ 13.3
18	30.11	50.0	„ „ 22.5	„ 27.3	„ 27.2	„ 14.0
19	30.30	50.3	„ „ 26.8	„ 26.9	„ 29.5	„ 16.0
20	30.39	52.1	„ „ 22.1	„ 26.2	„ 31.1	„ 13.0
23	30.23	55.6	„ „ 19.0	„ 23.8	„ 23.2	„ 10.0
24	30.22	59	„ „ 15.5	„ 20.9	„ 20.5	„ 9.0
May 18... Mean ...			352 31 22.21	31 25.77	31 26.85	31 13.93
Refract. and Reduct.			−1 25.3	1 25.3	1 25.3	1 25.3
			352 29 56.9	30 0.5	30 1.5	29 48.6

Mean of 4 Microscopes.....7° 43′ 18″.8 by 16 Observ.

Superior Culmination.

1828.	Barom.	Therm.	Microscopes. I.	II.	III.	IV.
	inches.	°	° ′ ″	° ′ ″	° ′ ″	° ′ ″
May 27	29.94	49	7 58 11	58 14.5	58 12	58 11.7
29	29.81	34.5	„ „ 8.7	„ 19.2	„ 17.0	„ 15.0
31	29.93	35	„ „ 10	„ 16.4	„ 13.0	„ 13
June 1	30.05	35	„ „ 7.5	„ 13.0	„ 14.2	„ 10.2
6	29.57	39.5	„ „ 10.0	„ 13.0	„ 8.1	„ 11.0
7	29.48	39.0	„ „ 13.3	„ 16.0	„ 15.0	„ 19.0
9	29.69	50	„ „ 11.1	„ 15.4	„ 10.5	„ 19
12	30.05	29	„ „ 21.0	„ 19.5	„ 18.0	„ 25
17	30.112	38.5	„ „ 13.4	„ 15.5	„ 13.0	„ 19
19	30.34	36.5	„ „ 17.0	„ 17.0	„ 12.3	„ 18
20	30.37	35.5	„ „ 16.8	„ 20	„ 17.0	„ 23
26	30.30	45	„ „ 18.8	„ 13.5	„ 8.7	„ 19
June 9... Mean ...			7 58 13.2	58 16.1	58 13.2	58 16.9
Refract. and Reduct.			−1 42.7	1 42.7	1 42.7	1 42.7
Superior Culminat.			7 56 30.5	56 33.4	56 30.5	56 34.2
Inferior Culminat...			352 29 56.9	29 58.8	30 1.0	29 51.4
Half Diff. S. P. D.			7 43 16.8	43 17.3	43 14.7	43 21.4

Inferior Culmination.

1828.	Barom.	Therm.	Microscopes. I.	II.	III.	IV.
	inches.	°	° ′ ″	° ′ ″	° ′ ″	° ′ ″
May 25	30.14	59	352 31 20.9	31 22.1	31 21.5	31 12
27	29.95	63	„ „ 18.5	„ 20.3	„ 23.0	„ 14.2
28	29.87	55	„ „ 20.1	„ 22.5	„ 27.0	„ 13.0
29	29.80	50.7	„ „ 21.0	„ 20.5	„ 26.0	„ 14.7
30	29.79	51.0	„ „ 21.9	„ 24.4	„ 28.3	„ 11.5
31	29.82	55	„ „ 16.5	„ 19.0	„ 19.6	„ 15.0
June 1	30.00	50	„ „ 20.8	„ 23.0	„ 21.2	„ 13
2	29.99	53	„ „ 13.0	„ 18.0	„ 20.0	„ 16.8
3	29.95	55	„ „ 13.4	„ 18.0	„ 21.4	„ 10
6	29.70	52	„ „ 17.4	„ 20.2	„ 17.7	„ 9
7	29.47	55.5	„ „ 15.2	„ 18.0	„ 21.0	„ 7.4
10	29.72	52	„ „ 19.5	„ 20.0	„ 26.2	„ 13
11	29.70	54	„ „ 22.2	„ 19.0	„ 21.0	„ 17.4
June 2... Mean ...			352 31 18.5	31 20.4	31 22.6	31 13.0
Refract. and Reduct.			−1 21.6	1 21.6	1 21.6	1 21.6
			352 29 56.9	29 58.8	30 1.0	29 51.4

Mean of 4 Microscopes.....7° 43′ 17″.55 by 25 Observ.

Mean S. P. D. of β Octantis, Jan. 1, 1828 . . . . . 7° 43′ 18″.12 by 89 Observ.

ε Octantis. (Ann. Var. + 17″.336.)

Superior Culmination.

1827.	Barom.	Therm.	Microscopes. I.	II.	III.	IV.
	inches.	°	° ′ ″	′ ″	′ ″	′ ″
May 25	30.125	48	8 58 51.0	59 3.2	58 54	59 11.7
31	30.332	45	„ 58 57.5	„ 1.7	58 54.3	„ 11.2
June 1	30.268	40.3	„ 58 59.0	„ 4.1	58 56.5	„ 15.7
7	30.09	47	„ 58 54.0	„ 1.5	58 52.5	„ 9.3
13	29.90	39	„ 59 1.0	„ 4.3	59 0	„ 16.0
June 3	... Mean ...		8 58 56.5	59 2.96	58 55.6	59 12.8
Refract. and Reduct.			−1 21.3	1 21.3	1 21.3	1 21.3
Superior Culminat.			8 57 35.2	51 41.7	57 34.3	57 51.5
Inferior Culminat...			351 32 16.6	32 17.8	32 19.2	32 19.6
Half Diff. S. P. D.			8 42 39.5	42 42.0	42 37.5	42 45.9

Inferior Culmination.

1827.	Barom.	Therm.	Microscopes. I.	II.	III.	IV.
	inches.	°	° ′ ″	′ ″	′ ″	′ ″
May 25	30.072	62	351 34 3	34 3	34 4.5	34 5
27	30.122	56	„ „ 0	„ 1	„ 5.0	„ 7
30	30.17	66	„ „ 7	„ 1	„ 4.0	„ 8
31	30.18	66	„ „ 2.5	„ 6.5	„ 5.7	„ 9.7
June 2	30.20	56	„ „ 0	„ 5.6	„ 6.3	„ 6.2
May 29	... Mean ...		351 34 2.5	34 3.8	34 5.1	34 5.6
Refract. and Reduct.			−1 45.9	1 46.0	1 45.9	1 46.0
			351 32 16.6	32 17.8	32 19.2	32 19.6

Mean of 4 Microscopes 8° 42′ 41″.2.....by 10 Observ.

1828.	Barom.	Therm.	Microscopes. I.	II.	III.	IV.
	inches.	°	° ′ ″	′ ″	′ ″	′ ″
May 15	30.03	37.5	8 57 31.5	57 38.4	57 34	57 33
17	30.07	34.5	„ „ 35.0	„ 45	„ 34.6	„ 36
18	30.22	34.6	„ „ 32	„ 38	„ 34	„ 31.7
19	30.40	36	„ „ 35	„ 42.3	„ 36.2	„ 41.0
23	30.27	49	„ „ 31.5	„ 39.6	„ 29.5	„ 36
27	29.935	40.4	„ „ 31.5	„ 40.0	„ 28.7	„ 32.7
29	29.81	35	„ „ 34.0	„ 35.0	„ 30.8	„ 37
31	29.93	34.7	„ „ 31	„ 39	„ 28	„ 32.6
June 1	30.05	35	„ „ 31.5	„ 36.5	„ 28	„ 34.2
6	29.56	40	„ „ 31.4	„ 33.7	„ 33.1	„ 33.8
May 25	... Mean ...		8 57 32.4	57 38.7	57 31.7	57 34.8
Refract. and Reduct.			−1 37.9	1 37.9	1 37.9	1 37.9
Superior Culminat.			8 55 54.5	56 0.8	55 53.8	55 56.9
Inferior Culminat...			351 30 35.5	30 38.6	30 40.1	30 28.0
Half Diff. S. P. D.			8 42 39.5	42 41.1	42 36.8	42 44.4

Inferior Culmination.

1828.	Barom.	Therm.	Microscopes. I.	II.	III.	IV.
	inches.	°	° ′ ″	′ ″	′ ″	′ ″
May 16	30.05	51	351 32 9.7	32 13.5	32 18.8	32 6.7
18	30.10	50	„ 32 9.0	„ 10.2	„ 13.0	32 0.0
19	30.30	50.5	„ 32 9.0	„ 10.5	„ 13.4	31 57.8
20	30.37	56	„ 32 6.0	„ 10.0	„ 7.0	31 58.2
23	30.23	56	„ 32 5.0	„ 10.6	„ 12.5	32 0.5
24	30.22	59	„ 32 5.4	„ 7.8	„ 7.0	31 56.0
25	30.14	59	„ 32 10.0	„ 10.0	„ 6.2	31 56.0
27	29.95	63	„ 32 2.1	„ 6.1	„ 8.4	31 55.3
28	29.87	54.7	„ 32 5.3	„ 8.6	„ 10.1	31 57.5
29	29.80	53.0	„ 32 6.0	„ 7.7	„ 10.0	31 58.0
31	29.82	56	„ 32 2.5	„ 5.0	„ 11.3	31 55
June 1	29.98	53	„ 31 57.7	„ 5.0	„ 3.0	31 55
2	29.99	53	„ 31 58.7	„ 1.0	„ 5.5	31 53.4
May 25	... Mean ...		351 32 5.1	32 8.2	32 9.7	31 57.65
Refract. and Reduct.			−1 29.6	1 29.6	1 29.6	1 29.6
			351 30 35.5	30 38.6	30 40.1	30 28.0

Mean of 4 Microscopes.....8° 42′ 40″.45 by 23 Observ.

Mean S. P. D. of ε Octantis, Jan. 1, 1828 . . . . . 8° 42′ 40″.7 by 33 Observ.

γ Apodis. (Ann. Var. — 9″.433.)

Superior Culmination.

1822.	Barom.	Therm.	Microscopes. I.	II.	III.	IV.
	inches.	°	h ′ ″	′ ″	h ′ ″	h ′ ″
Aug. 25	30.04	57.7	0 27 48.7	.....	27 54	27 46.7
27	29.55	41	„ „ 54	.....	„ 58.2	„ 44
29	29.67	56	„ „ 43	28 13.8	„ 49.3	„ 44.2
30	29.56	66	„ „ 48.5	.....	„ 52.2	„ 39.5
31	30.60	53	„ „ 49.0	.....	„ 49.3	„ 46.5
Sept. 1	29.85	53.5	„ „ 49	.....	„ 46.3	„ 50.8
Aug. 29	... Mean ...		49 27 48.7	28 13.8	27 51.5	27 45.3
Refract. + Reduct.			−1 22.6	1 22.6	1 22.6	1 22.6
Superior Culminat.			49 26 26.1	26 51.2	26 28.9	26 20.7
Inferior Culminat...			26 25 8.8	25 42.6	25 25.5	25 15.1
Half Diff. S. P. D.			11 30 38.6	30 34.3	30 31.7	30 32.8

Inferior Culmination.

1822.	Barom.	Therm.	Microscopes. I.	II.	III.	IV.
	inches.	°	h ′ ″	h ′ ″	h ′ ″	h ′ ″
Aug. 24	30.13	40.7	26 27 5.7	27 33	27 22	27 13
26	29.55	43	„ „ 3.0	„ 45.5	„ 22	„ 12.7
31	29.78	45.5	„ „ 5.3	.....	„ 21.7	„ 13.3
Sept. 4	29.54	42.3	„ „ 7.3	„ 25	„ 20.7	„ 12.0
6	29.60	41	„ „ 3.3	„ 28.3	„ 17.5	„ 6.5
11	29.93	39	„ „ 7.4	„ 35.0	„ 28.0	„ 12.8
Sept. 1	... Mean ...		26 27 5.3	27 39.2	27 22	27 11.7
Refract. and Reduct.			−1 56.5	1 56.6	1 56.5	1 56.6
			26 25 8.8	25 42.6	25 25.5	25 15.1

Mean of 4 Microscopes.....11° 30′ 34″.4 by 12 Observ.

Superior Culmination.

1826.	Barom.	Therm.	Microscopes. I.	II.	III.	IV.
	inches.	°	h ′ ″	h ′ ″	′ ″	h ′ ″
Aug. 11	29.93	62	12 12 16.5	12 12	.....	12 14.0
12	30.06	54	„ „ 20.5	„ 16.8	12 14.7	„ 18.7
19	29.73	54	„ „ 10.0	„ 9.0	.....	„ 11.0
25	29.80	54	„ „ 16.8	„ 11.0	„ 15.5	„ 20.9
26	30.04	49	„ „ 11.3	„ 8.7	„ 10.7	„ 14.1
27	.....	54	„ „ 14.4	„ 10.7	.....	„ 17.3
28	29.86	58	„ „ 16.0	„ 9.0	„ 6.0	„ 13.3
Sept. 2	29.88	66	„ „ 9.0	„ 6.8	.....	„ 15.1
3	29.93	63	„ „ 20.3	„ 13.0	.....	„ 21.0
Aug. 24	... Mean ...		12 12 15.0	12 9.7	12 11.7	12 16.1
Refract. and Reduct.			−53.0	53.0	53.0	53.0
Superior Culminat.			12 11 22	11 16.7	11 18.7	11 23.1
Inferior Culminat...			349 10 10.8	10 5.2	10 9.2	10 3.8
Half Diff. S. P. D.			11 30 35.6	30 35.7	30 34.7	30 39.6

Inferior Culmination.

1826.	Barom.	Therm.	Microscopes. I.	II.	III.	IV.
	inches.	°	h ′ ″	h ′ ″	h ′ ″	h ′ ″
Aug. 18	29.75	43	349 12 35.5	12 32.2	12 37.5	12 28.1
19	29.77	42	„ „ 35.0	„ 30.3	„ 33.7	„ 29.7
25	29.96	39.5	„ „ 33.7	„ 33.0	„ 38.5	
27	.....	.....	„ „ 37.0	„ 30.0	„ 36.0	„ 32.5
Sept. 1	29.90	50.0	„ „ 32.2	„ 29.0	„ 31.5	„ 24.6
2	29.88	45.5	„ „ 35.5	„ 29.2	„ 33.4	„ 27.7
8	29.60	42	„ „ 42.0	„ 25.0	„ 32	„ 27.4
12	29.77	56	„ „ 34.0	„ 28	„ 30.0	„ 29.0
14	29.85	44.5	„ „ 30.7	„ 29	„ 29	„ 25.7
Aug. 31	... Mean ...		349 12 35.1	12 29.5	12 33.5	12 28.1
Refract. and Reduct.			−2 24.3	2 24.3	2 24.3	2 24.3
			349 10 10.8	10 5.2	10 9.2	10 3.8

Mean of 4 Microscopes.....11° 30′ 36″.4 by 18 Observ.

γ Apodis. (Ann. Var. $-9''.433$.)—(Continued.)

Superior Culmination.

1827.	Barom.	Therm.	Microscopes. I.	II.	III.	IV.
	inches.	°	° ′ ″	′ ″	′ ″	′ ″
Aug. 6	30.10	51	11 46 18	46 51.6	46 27	46 51.3
15	30.04	49.5	„ „ 18	.....	„ 26	„ 31.7
19	29.96	58	„ „ 16	„ 24.3	„ 23.8	„ 39.0
20	29.95	59	„ „ 16.2	„ 13.0	„ 21.0	„ 29.0
21	30.04	51	„ „ 18.0	„ 23	„ 25.1	„ 31
22	.....	.....	„ „ 11.8	„ 24	„ 21.3	„ 27
27	29.71	55	„ „ 18.0	„ 24	„ 23.0	„ 31
28	29.58	63	„ „ 15.4	„ 20.8	„ 20.4	„ 29.7
Sept. 3	30.00	52	„ „ 16.0	.....	„ 25.0	„ 34.0
Aug. 21.3...Mean...			11 46 16.4	46 22.8	46 23.6	46 30.7
Refract. — Reduct.			−46.6	46.6	46.6	46.6
Superior Culminat.			11 45 29.8	45 36.2	45 37.0	45 44.1
Inferior Culminat...			348 44 24.4	44 25.2	44 29.6	44 24.3
Half Diff. S. P. D.			11 30 32.7	30 35.5	30 33.7	30 39.9

Inferior Culmination.

1827.	Barom.	Therm.	Microscopes. I.	II.	III.	IV.
	inches.	°	° ′ ″	′ ″	′ ″	′ ″
Aug. 17	30.10	36.5	348 46 58	47 1	47 5	46 55
18	29.91	48	„ „ 53.5	46 58.5	46 59.6	46 52.8
21	29.99	42	„ „ 54.0	46 56.5	46 54	46 53.3
27	29.77	39	„ „ 58.7	46 55.2	47 5.0	47 0.3
28	29.73	50.5	„ „ 52.5	46 51.7	47 3.0	46 53.0
30	30.02	38	„ „ 55.0	46 57.0	47 59.4	46 54.5
Sept. 1	30.23	40	„ „ 57.0	46 55.0	47 58.5	46 59.5
Aug. 24.7...Mean...			348 46 55.5	46 56.4	47 0.7	46 55.5
Refract. + Reduct.			−2 31.1	2 31.2	2 31.1	2 31.2
			348 44 24.4	44 25.2	44 29.6	44 24.3

Mean of 4 Microscopes.....11° 30′ 35″.45 by 16 Observ.

1828.

1828.	Barom.	Therm.	Microscopes. I.	II.	III.	IV.
	inches.	°	° ′ ″	′ ″	′ ″	′ ″
Aug. 11	30.21	46.5	11 44 57.4	45 2	45 4.7	45 5.2
14	30.00	52	„ „ 59.3	45 4.6	44 59	„ 8.0
15	29.72	58	„ „ 55.0	44 55.5	44 59	„ 1.8
17	29.48	62.7	„ „ 55.4	44 57.5	44 57.5	„ 0.0
20	30.00	63.3	„ „ 49.0	44 53.0	44 54.0	„ 56.0
21	30.09	57	„ „ 48.7	44 50.2	44 52.5	„ 54
24	30.05	57.0	„ „ 50.5	44 55.7	44 54.0	„ 56
25	29.71	68	„ „ 48.5	44 52.1	44 51.6	„ 55.6
26	29.82	65	„ „ 45.4	44 51.3	44 50.5	„ 53
27	29.93	63	„ „ 44.2	44 51.5	44 48	„ 52.7
28	30.27	54	„ „ 45.0	44 50.0	44 45.2	„ 50
29	30.10	61.3	„ „ 46	44 48.5	44 46.7	„ 52.2
30	30.24	64.7	„ „ 46	44 49.0	44 46.4	„ 48
31	30.30	62.2	„ „ 50	44 48.5	44 49.0	„ 51.4
Sept. 2	30.15	67	„ „ 42	.....	44 45.3	„ 51.0
Aug. 23.4...Mean...			11 44 49.5	44 53.6	44 48.2	44 55.6
Refract. and Reduct.			−41.1	41.2	41.1	41.2
Superior Culminat.			11 44 8.4	44 12.4	44 7.1	44 14.4
Inferior Culminat...			348 43 1.6	42 59.7	43 0.6	42 52.3
Half Diff. S. P.D.			11 30 33.4	30 36.4	30 33.3	30 41.0

1828.

1828.	Barom.	Therm.	Microscopes. I.	II.	III.	IV.
	inches.	°	° ′ ″	′ ″	′ ″	′ ″
Aug. 15	29.67	44.5	348 45 47.6	45 46.0	45 44	45 36.3
16	29.65	57.3	„ „ 44	„ 43.0	„ 44.5	„ 39
19	30.10	47.2	„ „ 45	„ 43.0	„ 42.5	„ 33.7
20	30.09	38.3	„ „ 46.0	„ 42.5	„ 43	„ 36.0
21	30.14	38.5	„ „ 43.7	„ 43.5	„ 49	„ 37.3
22	.....	.....	„ „ 48.5	„ 45.0	„ 45	„ 38.0
23	30.05	40	„ „ 48.0	„ 46.0	„ 46	„ 35
25	29.81	45	„ „ 44.0	„ 42.0	„ 41.3	„ 32
26	29.87	44	„ „ 41.0	„ 39.0	„ 40.4	„ 30
27	30.22	36.2	„ „ 42	„ 40.0	„ 39	„ 31.6
28	30.24	34	„ „ 41.4	„ 39.0	„ 41	„ 30.6
29	30.17	36.5	„ „ 40.0	„ 41.0	„ 41	„ 33.5
31	30.25	42	„ „ 40.0	„ 38.8	„ 37.6	„ 31.0
Sept. 1	30.23	43	„ „ 44.0	„ 40.0	„ 39.4	„ 32
2	30.15	42.5	„ „ 40.0	„ 37.7	„ 40.0	„ 31.3
3	29.85	51.0	„ „ 31.2	„ 29.3	„ 30.0	„ 24.5
7	29.62	54.5	„ „ 31.0	„ 28.0	„ 29.0	„ 23.8
8	29.92	41.0	„ „ 32.0	„ 33.7	„ 37.5	„ 28.0
9	29.79	44.7	„ „ 32.0	„ 29.5	„ 32.0	„ 22.0
Aug. 28.... Mean ...			348 45 41.1	45 39.3	45 40.1	45 31.9
Refract. and Reduct.			−2 39.5	2 39.6	2 39.5	2 39.6
			348 43 1.6	42 59.7	43 0.6	42 52.3

Mean of 4 Microscopes ..... 11° 30′ 36″.01 by 34 Observ.

Mean S. P. D. of γ Apodis, Jan. 1, 1828 . . . . . 11° 30′ 35″.74 by 80 Observ.

β Chamæleontis. (Ann. Var. — 19.″997.)

Superior Culmination.								Inferior Culmination.							
1823.	Barom.	Therm.	Microscopes. I.	II.	III.	IV.		1823.	Barom.	Therm.	Microscopes. I.	II.	III.	IV.	
	inches.		° ′ ″		′ ″	′ ″			inches.		° ′ ″		′ ″	′ ″	
June 15	29.69	57	147 38 25.1	.....	39 9.6	38 50		June 15	29.73	53.3	134 20 30.7	21 45	21 10.3	20 49.5	
Refract. + Reduct.			−2 0.4	.....	2 0.4	2 0.4		Refract. − Reduct.			−1 15.2	1 15.2	1 15.2	1 15.2	
Superior Culminat.			147 36 24.7	.....	37 9.2	36 49.6					134 19 5.5	20 29.8	19 55.1	19 34.3	
Inferior Culminat...			134 19 5.5	.....	19 55.1	19 34.3									
Half Diff. S. P. D.			11 38 39.6	.....	38 37.1	38 37.6									

Mean S. P. D. of β Chamæleontis, Jan. 1, 1828 ..... 11° 38′ 38″.1 by 2 Observ.

η Chamæleontis. (Ann. Var. — 13″.328.)

Superior Culmination.								Inferior Culmination.							
1822.	Barom.	Therm.	Microscopes. I.	II.	III.	IV.		1822.	Barom.	Therm.	Microscopes. I.	II.	III.	IV.	
	inches.		° ′ ″		′ ″	′ ″			inches.		° ′ ″		′ ″	′ ″	
May 6	30.20	59	11 41 40.0	.....	41 40.7	41 35.0		May 9	29.89	50	348 21 24.7	21 43	21 32	21 6.0	
Refract. and Reduct.			−1 54.2	.....	1 54.3	1 54.2		Refract. and Reduct.			−1 24.1	1 24.1	1 24.1	1 24.2	
Superior Culminat.			11 39 45.8	.....	39 46.4	39 40.8					348 20 0.6	20 18.9	20 07.9	19 41.8	
Inferior Culminat...			348 20 0.6	.....	20 7.9	19 41.8									
Half Diff. S. P. D.			11 39 52.6	.....	39 49.2	39 59.5									

Mean S. P. D. of η Chamæleontis, Jan. 1, 1828 ..... 11° 39′ 53″.8 by 2 Observ.

α Apodis. (Ann. Var. — 16″.154.)

Superior Culmination.								Inferior Culmination.							
1827.	Barom.	Therm.	Microscopes. I.	II.	III.	IV.		1827.	Barom.	Therm.	Microscopes. I.	II.	III.	IV.	
	inches.		° ′ ″	′ ″	′ ″	′ ″			inches.		° ′ ″	′ ″	′ ″	′ ″	
July 28	30.25	49.5	11 57 30.5	57 45	57 40	57 48		July 29	30.05	45	348 35 53	35 52.7	36 4.0	35 54	
Aug. 3	30.12	52	11 57 29	.....	57 42	57 44		30	29.81	54	„ „ 45	„ 40.3	35 53.5	„ 47.6	
Ju y 31	... Mean ...		11 57 29.75	57 45	57 41.0	57 46		31	30.04	49	„ „ 48	„ 47.0	35 54.0	„ 49.0	
Refract. − Reduct.			−46.17	46.2	46.2	46.1		Aug. 1	30.08	32	„ „ 50	„ 53.0	36 5.0	„ 54.5	
Superior Culminat.			11 56 43.58	56 58.8	56 54.8	56 59.9		2	30.07	33	„ „ 52.8	„ 46.3	35 56.4	„ 54.4	
Inferior Culminat...			348 33 16.1	33 14.3	33 25.0	33 18.3		July 31	... Mean ...		348 35 49.76	35 47.9	35 58.6	35 51.9	
Half Diff. S. P. D.			11 41 43.7	41 52.2	41 44.9	41 50.8		Refract. and Reduct.			−2 33.63	2 33.6	2 33.6	2 33.6	
											348 33 16.1	33 14.3	33 25.0	33 18.3	

Mean of 4 Microscopes .....11° 41′ 47″.9 by 7 Observ.

α Apodis. (Ann. Var. — 16″.154.)—(Continued.)

Superior Culmination.

1828.	Barom.	Therm.	Microscopes. I.	II.	III.	IV.
	inches.	°	h m s	s	s	s
July 21	29.59	49	11 55 58.4	56 0.0	56 4	56 6.7
22	29.73	50	„ 55 59.0	„ 2.2	„ 6.0	„ 7.0
23	30.07	55	„ 56 3.0	„ 5.7	„ 7.2	„ 9.4
24	30.07	50.5	„ 56 3	„ 5.0	„ 11.0	„ 11.0
30	30.12	50	„ 56 4	„ 9.0	„ 13.0	„ 10.7
31	30.25	44	„ 56 6	„ 9.1	„ 12.2	„ 17.2
Aug. 1	30.20	50	„ 56 9	„ 12.2	„ 14.0	„ 16.8
2	30.18	50	„ 56 6.3	„ 10.5	„ 9.7	„ 10.0
3	30.18	52.5	„ 56 7.0	„ 7.7	„ 8.3	„ 15
6	29.73	67	„ 56 2.7	„ 10.0	„ 10.2	„ 14.7
7	30.04	55	„ 56 2.3	„ 12.5	„ 10.0	„ 10.2
10	29.97	57	„ 56 2.0	„ 6.0	„ 6.2	„ 10
July 30.5	...Mean...		11 56 3.56	56 7.5	56 9.3	56 11.5
Refract. and Reduct.			−32.05	32.0	32.1	32.0
Superior Culminat.			11 55 31.51	55 35.5	55 37.2	55 39.5
Inferior Culminat...			348 32 1.5	31 55.7	32 3.2	31 52.5
Half Diff. S. P. D.			11 41 45.0	41 49.9	41 47.0	41 53.5

Inferior Culmination.

1828.	Barom.	Therm.	Microscopes. I.	II.	III.	IV.
	inches.	°	h m s	s	s	s
July 20	29.56	43	348 34 40	34 32.3	34 40.2	34 30
22	29.81	45.5	„ 34 47.2	„ 40.0	34 51.3	„ 40
23	30.15	33	„ 34 52	„ 48	34 54.5	„ 40
24	30.03	35.5	„ 34 51.5	„ 45	34 54	„ 44
25	30.14	37.5	„ 34 49	„ 50	34 56.3	„ 43
26	30.29	35.5	„ 35 2	„ 52.7	35 1.0	„ 51
27	30.23	34	„ 34 52.7	„ 49.3	34 56.2	„ 47.2
30	30.22	37.2	„ 35 1.5	„ 54	35 1.2	„ 48.7
Aug. 1	30.24	37.0	„ 34 55.0	„ 49.3	34 53	„ 45.0
2	30.18	37.0	„ 34 56	„ 45.5	34 56	„ 44.6
3	30.22	37	„ 34 57.0	„ 51.0	34 57.3	„ 47.8
7	30.15	39	„ 34 50.5	„ 46.3	34 53.0	„ 45.5
8	.....	.....	„ 34 50.5	„ 46	34 52.0	„ 41.0
July 31	... Mean ...		348 34 52.7	34 46.9	34 54.3	34 43.7
Refract. and Reduct.			−2 51.2	2 51.2	2 51.1	2 51.2
			348 32 1.5	31 55.7	32 3.2	31 52.5

Mean of 4 Microscopes .....11° 41′ 48″.83 by 25 Observ.

Mean S. P. D. of α Apodis, Jan. 1, 1828 . . . . . 11° 41′ 48″.66 by 32 Observ.

β Hydri. (Ann. Var. + 19″.972.)

Superior Culmination.

1822.	Barom.	Therm.	Microscopes. I.	II.	III.	IV.
	inches.	°	h m s	′ ″	s	s
May 28	30.03	46	11 45 41.1	.....	46 1.3	45 53.7
June 9	29.88	38	„ 45 52.0	.....	„ 14.8	45 3.7
12	29.80	52	„ 45 52	45 37.8	„ 9.2	45 59.2
13	29.97	42	„ 45 54	.....	„ 3.2	45 57.7
15	30.05	35	„ 45 51.0	.....	„ 10.0	46 4.4
16	30.00	36	„ 45 56.0	.....	„ 12.0	46 8.0
21	29.74	41	„ 46 4.0	.....	„ 19	45 52.0
22	29.68	39	„ 46 8.0	.....	„ 29.2	46 14.5
June 13	... Mean ...		11 45 54.76	45 37.8	46 12.3	46 1.65
Refract. and Reduct.			+0 28.69	0 28.7	0 28.7	0 28.7
Superior Culminat.			11 46 23.45	46 6.5	46 41.0	46 30.35
Inferior Culminat...			348 13 25.0	13 9.3	13 41.3	13 21.6
Half Diff. S. P. D.			11 46 29.2	.....	46 29.8	46 34.4

Inferior Culmination.

1822.	Barom.	Therm.	Microscopes. I.	II.	III.	IV.
	inches.	°	h m s	s	s	s
May 21	29.96	50	348 17 15	16 43	17 26	16 52
29	29.93	48	„ „ 11.2	16 47.8	„ 27.8	17 12
June 2	29.85	51	„ „ 10.0	.....	„ 26.8	17 9.0
3	29.76	56	„ „ 11.0	17 3.4	„ 27.2	17 13.3
8	30.10	56	„ „ 18.7	17 12.2	„ 38.7	17 19.5
29	29.99	58	„ „ 23.5	17 9.5	„ 40.8	17 22.8
June 5	... Mean ...		348 17 14.9	16 59.18	17 31.2	17 11.45
Refract. and Reduct.			−3 49.9	3 49.9	3 49.9	3 49.9
			348 13 25.0	13 9.3	13 41.3	13 21.6

Mean of 4 Microscopes.....11° 46′ 31″.15 by 14 Observ.

β Hydri. (Ann. Var. + 19″.972.)—(Continued.)

Superior Culmination.

1822.	Barom.	Therm.	Microscopes. I.	II.	III.	IV.
	inches.	°	° ′ ″	′ ″	′ ″	′ ″
July 4	29.93	35	49 42 4.3	41 48.7	42 28	42 6
5	29.90	36.2	„ „ 12.3	.....	„ 23	„ 8
7	29.41	42	„ „ 17.0	.....	„ 16.3	„ 9.5
July 5.5	...Mean...		49 42 8.4	41 48.7	42 22.4	42 7.8
Reduct. — Refract.			+27.9	28.0	27.9	28.0
Superior Culminat.			49 42 36.3	42 16.7	42 50.3	42 35.8
Inferior Culminat.			26 9 19.7	9 6.2	9 33.0	9 33.4
Half Diff. S. P. D.			11 46 38.3	46 35.2	46 38.6	46 31.2

Inferior Culmination.

1822.	Barom.	Therm.	Microscopes. I.	II.	III.	IV.
	inches.	°	° ′ ″	′ ″	′ ″	′ ″
June 30	.....	51	26 13 7.0	12 51.8	13 17.4	13 17.0
July 3	30.032	53	„ „ 8.0	„ 50.0	„ 20.0	„ 27.7
5	29.91	46	„ „ 5.5	„ 55.0	„ 24.5	„ 21.7
6	29.86	55.7	„ „ 2.0	„ 44.0	„ 10.0	„ 18.0
7	29.40	48.0	„ „ 3.0	„ 55	„ 14.3	„ 19.0
10	30.16	52	„ „ 9.0	„ 59	„ 28	„ 14.0
July 5.2	...Mean...		26 13 5.8	12 52.4	13 19.1	13 19.6
Refract. and Reduct.			−3 46.1	3 46.2	3 46.1	3 46.2
			26 9 19.7	9 06.2	9 33.0	9 33.4

Mean of 4 Microscopes.....11° 46′ 35″.85 by 9 Observ.

Superior Culmination.

1823.	Barom.	Therm.	Microscopes. I.	II.	III.	IV.
	inches.	°	° ′ ″	′ ″	′ ″	′ ″
May 27	29.63	55.2	147 44 1.8	.....	44 47.5	44 29.5
29	29.73	36.3	„ 43 55.5	.....	„ 47.2	„ 23.0
June 9	29.99	43.5	„ 44 7.8	.....	„ 57.6	„ 33.5
13	29.89	49	„ 44 14.0	45 5.9	„ 55.2	„ 37.8
15	29.78	48	„ 44 9.1	„ 16.7	„ 56.5	„ 33.5
June 6	... Mean ...		147 44 5.6	45 11.3	44 52.8	44 31.5
Refract. and Reduct.			+9.6	9.7	9.6	9.7
Superior Culminat.			147 44 15.2	45 21.0	45 2.4	44 41.2
Inferior Culminat.			194 11 13.9	12 36.6	11 58.1	11 34.7
Half Diff. S. P. D.			11 46 30.6	46 22.2	46 32.1	46 33.25

Inferior Culmination.

1823.	Barom.	Therm.	Microscopes. I.	II.	III.	IV.
	inches.	°	° ′ ″	′ ″	′ ″	′ ″
June 15	29.68	56	194 14 58.8	16 1.5	15 23	14 59.7
Refract. and Reduct.			−3 24.9	3 24.9	3 24.9	3 25.0
			194 11 13.9	12 36.6	11 58.1	11 34.7

Mean of 4 Microscopes.....11° 46′ 30″.3 by 6 Observ.

Superior Culmination.

1826.	Barom.	Therm.	Microscopes. I.	II.	III.	IV.
	inches.	°	° ′ ″	′ ″	′ ″	′ ″
May 20	30.08	53	12 27 58.5	28 0.8	.....	28 4.8
25	30.22	41	„ 28 3.0	„ 5.0	.....	„ 13.0
29	30.33	46	„ 28 8	„ 12.3	.....	„ 11.0
30	30.24	39.2	„ 28 6.0	„ 5.0	.....	„ 12.0
June 5	29.94	34	„ 28 12.0	„ 16.5	.....	„ 22.1
7	29.87	43	„ 28 8.0	„ 12.0	28 17	„ 19.7
8	29.95	35	„ 28 7.0	„ 15.0	„ 16	„ 18.5
9	30.00	34.7	„ 28 14.3	„ 13.2	„ 16.4	„ 11.5
10	30.56	35	„ 28 8.3	„ 15.0	„ 10.0	„ 17.1
11	30.20	31.7	„ 28 8.0	„ 9.0	„ 8.0	„ 17.5
13	30.23	31.5	„ 28 12.3	„ 20.0	„ 25.0	„ 24.3
15	30.18	32.0	„ 28 17.5	„ 19.0	„ 15.8	„ 17.3
19	30.05	39.0	„ 28 14.0	„ 13.0	.....	„ 22.8
20	29.99	42.0	„ 28 12.0	„ 15.8	.....	„ 23.5
June 7	... Mean ...		12 28 9.2	28 12.96	28 15.5	28 16.8
Refract. and Reduct.			−0 51.4	51.5	51.4	51.5
Superior Culminat.			12 27 17.8	27 20.8	27 24.1	27 25.3
Inferior Culminat.			348 54 11.8	54 9.1	54 13.5	54 7.5
Half Diff. S. P. D.			11 46 32	46 35.8	46 35.3	46 39.9

Inferior Culmination.

1826.	Barom.	Therm.	Microscopes. I.	II.	III.	IV.
	inches.	°	° ′ ″	′ ″	′ ″	′ ″
May 23	29.97	50	348 56 43.7	56 40.2	56 44.8	56 40.0
24	29.94	57	„ „ 38.7	„ 39.5	„ 41.7	„ 35
25	30.09	46	„ „ 41.2	„ 40.7	„ 47.0	„ 37.3
26	30.15	43.5	„ „ 39.5	„ 34.0	„ 46	„ 36.0
30	30.25	46.0	„ „ 42.0	„ 41.0	„ 42.5	„ 37.5
June 3	29.93	52	„ „ 42.3	„ 36.6	„ 42.5	„ 33.4
4	30.00	49	„ „ 46.3	„ 41.0	„ 40.0	„ 38.2
5	29.96	43	„ „ 48.2	„ 46.0	„ 51.5	„ 43.5
6	29.85	45	„ „ 48.0	„ 43.9	„ 47.1	„ 44.1
8	29.89	51.7	„ „ 46.3	„ 43.3	„ 47.7	„ 42.3
9	29.94	44	„ „ 43.0	„ 38.7	„ 44.5	„ 40.7
10	30.03	51	„ „ 38.8	„ 40.0	„ 43.0	„ 37.5
12	30.15	43	„ „ 46.7	„ 42.0	„ 46.4	
20	30.09	43	„ „ 40.7	„ 40.5	„ 43.5	„ 40.0
June 3.6	...Mean...		348 56 43.2	56 40.5	56 44.9	56 38.9
Refract. and Reduct.			2 31.4	2 31.4	2 31.4	2 31.4
			348 54 11.8	54 9.1	54 13.5	54 7.5

Mean of 4 Microscopes.....11° 46′ 35″.76 by 28 Observ.

β Hydri. (Ann. Var. + 19″.972.)—(Continued.)

Superior Culmination.

1826.	Barom.	Therm.	Microscopes. I.	II.	III.	IV.
	inches.	°	° ′ ″	′ ″	′ ″	′ ″
July 11	29.75	33	12 28 11	28 7.7	.....	28 19.1
12	29.93	39.2	„ „ 15	„ 13.8	.....	„ 17.0
15	30.09	39.0	„ „ 15	„ 14.0	.....	„ 21.0
25	29.70	38	„ „ 17.7	„ 20.0	.....	„ 18.5
27	29.89	44	„ „ 12.0	„ 13.0	.....	„ 12.5
July 18	... Mean ...		12 28 14.14	28 13.7	.....	28 17.6
Refract.	− Reduct.		−52.56	52.6	.....	52.5
Superior Culminat.			12 27 21.6	27 21.1	.....	27 25.1
Inferior Culminat...			348 54 15.1	54 10.3	.....	54 9.6
Half. Diff. S. P. D.			11 46 33.25	46 35.4	.....	46 37.7

Inferior Culmination.

1826.	Barom.	Therm.	Microscopes. I.	II.	III.	IV.
	inches.	°	° ′ ″	′ ″	′ ″	′ ″
July 6	30.053	49.5	348 56 47.3	56 37.0	56 43.1	56 38
10	29.83	46.5	„ „ 39.0	„ 36.5	„ 41.7	„ 33.5
12	29.84	53.0	„ „ 41.0	„ 37.0	„ 40.0	„ 35.3
13	30.06	50	„ „ 45.7	„ 43.0	„ 44.6	„ 44.0
July 10	... Mean ...		348 56 43.2	56 38.4	56 42.3	56 37.7
Refract.	+ Reduct.		−2 28.1	2 28.1	2 28.1	2 28.1
			348 54 15.1	54 10.3	54 14.2	54 9.6

Mean of 4 Microscopes..... 11° 46′ 35″.45 by 9 Observ.

1827.	Barom.	Therm.	Microscopes. I.	II.	III.	IV.
	inches.	°	° ′ ″	′ ″	′ ″	′ ″
May 5	30.128	59.5	12 2 27	2 30.5	2 29.5	2 22.8
7	30.163	57.0	„ „ 24	„ 25.0	„ 30.0	„ 37.0
8	30.145	58.0	„ „ 25.5	„ 23.7	„ 36.0	„ 45.0
15	30.123	57.4	„ „ 26.5	„ 36.8	„ 36.0	„ 40.0
16	30.000	53	„ „ 27.0	„ 27.5	„ 33.0	„ 46.5
19	30.053	43.5	„ „ 29.3	„ 37.0	„ 41.5	„ 43.7
23	30.185	55	„ „ 27.5	„ 44.0	„ 34.0	„ 39.0
24	30.176	55	„ „ 29.7	„ 36.2	„ 40.5	„ 45.5
May 14.5	...Mean...		12 2 27.06	2 32.6	2 35.1	2 39.9
Refract.	+ Reduct.		−1 2.0	1 2.0	1 2.0	1 2.0
Superior Culminat.			12 1 25.1	1 30.6	1 33.1	1 37.9
Inferior Culminat...			348 28 21.5	28 23.1	28 29.6	28 16.8
Half. Diff. S. P. D.			11 46 31.8	46 33.75	46 31.75	46 40.55

Mean Inside Temperature 57°.3.

1827.	Barom.	Therm.	Microscopes. I.	II.	III.	IV.
	inches.	°	° ′ ″	′ ″	′ ″	′ ″
Apr. 29	30.084	55.7	348 30 39	30 47.3	30 40.3	30 24.0
May 3	29.864	52.0	„ „ 40	„ 42.7	„ 46.0	„ 22.0
5	29.98	54	„ „ 46	„ 45.0	„ 50.3	„ 23.0
7	30.07	59.2	„ „ 38	„ 42.3	„ 51.6	„ 27.0
10	30.17	54.0	„ „ 39.7	„ 41.5	„ 45.5	„ 47.0
16	30.01	56	„ „ 35.8	„ 37.0	„ 44.0	„ 38.0
19	30.002	51	„ „ 40.0	„ 39.0	„ 48.2	„ 38.0
20	30.015	52.5	„ „ 33.0	„ 38.8	„ 44.0	„ 35
21	30.13	55.5	„ „ 31.3	„ 22.0	„ 31.0	„ 23
22	30.08	58.0	„ „ 37.0	„ 29.4	„ 45.0	„ 40.2
25	30.07	53	„ „ 38.5	„ 40.3	„ 51.0	„ 39.6
May 13.4	...Mean...		348 30 37.1	30 38.66	30 45.2	30 32.44
Refract.	− Reduct.		−2 15.6	2 15.6	2 15.6	2 15.6
			348 28 21.5	28 23.1	28 29.6	28 16.8

Mean Inside Temperature 56°.2.

Mean of 4 Microscopes.....11° 46′ 34″.46 by 19 Observ.

β Hydri. (Ann. Var. + 19″.972.)—(Continued.)

Superior Culmination.

1827.	Barom.	Therm.	Microscopes. I.	II.	III.	IV.
	inches.	°	h ′ ″	h ′ ″	h ′ ″	h ′ ″
May 24	30.176	55	12 2 29.7	2 36.2	2 40.5	2 45.5
June 5	30.222	54	„ „ 44.0	.....	„ 41.5	2 43.0
12	30.172	45	„ „ 40.0	2 53.0	„ 54.2	3 2.0
15	30.004	40	„ „ 40.5	2 44.0	„ 53.8	2 58.0
23	29.85	47	„ „ 39.0	.....	„ 53.0	2 56.0
July 2	29.95	51	„ „ 41.3	.....	„ 50	2 58.0
3	30.30	37	„ „ 45.5	2 59.2	„ 58	3 0.0
4	30.35	38.5	„ „ 44.2	3 0.0	„ 51.8	3 2.0
7	30.333	47.0	„ „ 43.0	2 58.7	„ 52	3 1.2
10	30.125	47	„ „ 45.5	2 50.0	„ 49	2 58.7
11	30.094	50.3	„ „ 40.7	2 55	„ 52	2 54
12	.....	44	„ „ 43	.....	„ 53.1	2 58.7
15	29.89	39	„ „ 40.8	2 57.0	„ 51.0	3 1.7
19	29.90	39.5	„ „ 42.5	2 57.7	„ 50.0	2 56.0
20	29.92	37.0	„ „ 40.0	2 50.5	„ 55.0	2 55.5
21	29.93	47.5	„ „ 41.0	2 47.2	„ 48	2 57.0
July 1	... Mean ...		12 2 41.3	2 52.4	2 50.8	2 56.7
Refract. + Reduct.			−1 11.1	1 11.1	1 11.1	1 11.1
Superior Culminat.			12 1 30.2	1 41.3	1 39.7	1 45.6
Inferior Culminat.			348 28 27.0	28 27.0	28 31.1	28 25.0
Half Diff. S. P. D.			11 46 31.6	46 37.1	46 34.3	46 40.3

Inferior Culmination.

1827.	Barom.	Therm.	Microscopes. I.	II.	III.	IV.
	inches.	°	° ′ ″	° ′ ″	° ′ ″	° ′ ″
May 25	30.072	53	348 30 38.5	30 40.3	30 51.0	30 39.6
31	30.181	48	„ „ 40.0	„ 36.3	„ 46.0	„ 37.4
June 1	30.30	49	„ „ 33.5	„ 36.6	„ 37.3	„ 36.2
2	30.212	50.3	„ „ 36.0	„ 40.5	„ 46.0	
12	30.269	51.0	„ „ 34.7	„ 38.6	„ 41.4	„ 37.5
15	29.898	56	„ „ 34.0	„ 35.0	„ 40.0	„ 33.8
18	30.232	46	„ „ 37.0	„ 38.7	„ 40.0	„ 35.0
23	29.83	54.5	„ „ 35.0	„ 36.1	„ 41.0	„ 33.4
24	29.86	61.0	„ „ 39.5	„ 38.7	„ 40.0	„ 38.0
27	30.05	48	„ „ 38.0	„ 38.5	„ 41.5	„ 32.0
29	29.93	44.7	„ „ 38.0	„ 33.8	„ 45.5	„ 36.0
30	30.01	46.5	„ „ 38.0	„ 33.3	„ 39.3	„ 35.3
July 3	30.14	48.5	„ „ 37.0	„ 38.5	„ 38.2	„ 33.0
4	30.34	48	„ „ 38.7	„ 38.2	„ 40.0	
5	30.37	48	„ „ 41.2	„ 42.8	„ 42.0	„ 37.0
10	30.13	53	„ „ 37.0	„ 31.4	„ 35.7	„ 30.7
11	30.06	52	„ „ 37.0	„ 35.5	„ 38.0	„ 33.2
June 21	... Mean ...		348 30 37.24	30 37.22	30 41.35	30 35.21
Refract. and Reduct.			−2 10.23	2 10.23	2 10.23	2 10.23
			348 28 27.0	28 27.0	28 31.1	28 25.0

Mean of 4 Microscopes.....11° 46′ 35″.84 by 33 Observ.

1828.	Barom.	Therm.	Microscopes. I.	II.	III.	IV.
	inches.	°	° ′ ″	° ′ ″	° ′ ″	° ′ ″
Apr. 20	29.85	66.2	12 1 20.0	1 16.2	1 30.3	1 23.0
26	29.94	62.0	„ „ 12.7	„ 13.5	„ 22.5	„ 15.3
29	30.14	57.0	„ „ 11.3	„ 28.5	„ 19.0	„ 11.7
May 7	29.88	57.0	„ „ 18.7	„ 23.0	„ 30.4	„ 20.0
9	29.78	62.3	„ „ 15.6	„ 16.2	„ 25.0	„ 14.7
10	29.80	70	„ „ 12.7	„ 14.4	„ 18.0	„ 14.0
May 2	... Mean ...		12 1 15.2	1 18.6	1 24.2	1 24.7
Refract. and Reduct.			−1 14.4	1 14.4	1 14.4	1 14.4
Superior Culminat.			12 0 0.8	0 4.2	0 9.8	0 10.3
Inferior Culminat.			348 26 53.4	26 55.3	26 57.6	26 46.0
Half. Diff. S. P. D.			11 46 33.7	46 34.4	46 36.1	46 42.1

1828.	Barom.	Therm.	Microscopes. I.	II.	III.	IV.
	inches.	°	° ′ ″	° ′ ″	° ′ ″	° ′ ″
Apr. 12	30.00	60.2	348 29 4	29 7.5	29 9	28 59
16	30.17	57.7	„ 28 55	28 56.5	29 3	„ 48
21	29.83	52	„ 28 55	29 0.8	28 59.5	„ 48
22	29.90	57.5	„ 28 56.7	28 59.2	29 1.0	„ 49
24	29.82	52	„ 29 0.3	28 58.3	29 0.3	„ 50.4
26	29.95	58	„ 28 54.5	28 58.5	28 59.3	„ 45.0
30	30.10	56.6	„ 28 49.0	28 50.7	28 58.8	„ 43.3
May 2	30.27	56.0	„ 28 52.0	28 57.0	28 59.0	„ 45.7
8	29.71	55.7	„ 28 52.5	28 52.0	28 51.6	„ 45.4
9	29.66	66	„ 28 50.8	28 51.6	28 50.8	„ 42.0
11	29.74	66	„ 28 45.7	28 46.0	28 49.6	„ 38.7
Apr. 27.2	... Mean ...		348 28 54.1	28 56.1	28 58.3	28 46.8
Refract. and Reduct.			−2 0.7	2 0.8	2 0.7	2 0.8
			348 26 53.4	26 55.3	26 57.6	26 46.0

Mean of 4 Microscopes.....11° 46′ 36″.6 by 17 Observ.

β Hydri. (Ann. Var. + 19″.972.)—(Continued.)

Superior Culmination.

1828.	Barom.	Therm.	Microscopes. I.	II.	III.	IV.
	inches.	°	° ′ ″	′ ″	′ ″	′ ″
May 13	29.88	70	12 1 14.0	1 22.8	1 21.3	1 16.0
15	30.08	51.8	„ „ 12.0	„ 15.7	„ 23.0	„ 14.0
17	30.14	43.8	„ „ 15.2	„ 20.7	„ 24.0	„ 10.0
18	30.27	44	„ „ 14.8	„ 17.2	„ 23.0	„ 13.0
19	30.43	44.5	„ „ 18.1	„ 22.7	„ 23.5	„ 15.3
20	30.41	52	„ „ 12.6	„ 17.1	„ 24.5	„ 11.0
24	30.24	48	„ „ 13.7	„ 20.3	„ 17.8	„ 17.0
28	29.892	38	„ „ 14.0	„ 23.8	„ 25.5	„ 17.0
29	29.83	38.2	„ „ 12.0	„ 24.0	„ 23.3	„ 10.0
30	29.80	39	„ „ 4.5	„ 18.5	„ 17.7	„ 8.0
May 21.3	...Mean...		12 1 13.1	1 20.3	1 22.4	1 13.1
Refract. and Reduct.			−1 22.8	1 22.9	1 22.8	1 22.9
Superior Culminat.			11 59 50.3	59 57.4	59 59.6	59 50.2
Inferior Culminat.			348 26 40.8	26 44.0	26 45.7	26 34.0
Half. Diff. S. P. D.			11 46 34.75	46 36.7	46 36.9	46 38.1

Inferior Culmination.

1828.	Barom.	Therm.	Microscopes. I.	II.	III.	IV.
	inches.	°	° ′ ″	′ ″	′ ″	′ ″
May 12	29.67	78	348 28 38	28 45	28 45	28 32.5
13	29.78	70	„ „ 39.2	„ 39.3	„ 44.4	„ 34.1
14	29.88	66	„ „ 36.6	„ 42	„ 42.5	„ 31.0
15	29.98	51.7	„ „ 40.0	„ 40	„ 38.3	„ 32.5
16	30.05	43	„ „ 40.3	„ 43	„ 45.0	„ 31
18	30.11	50	„ „ 36.0	„ 41.2	„ 40.2	„ 32
19	30.34	42.5	„ „ 40.0	„ 44.3	„ 45.0	„ 29.7
20	30.37	47.5	„ „ 40.0	„ 41.0	„ 41.4	„ 32.1
23	30.22	55.6	„ „ 38.7	„ 40.3	„ 48.0	„ 31.5
24	30.23	56	„ „ 33.5	„ 39.0	„ 37.6	„ 26.5
25	30.14	56	„ „ 36.5	„ 37.8	„ 40.1	„ 36.0
27	29.99	52	„ „ 36.0	„ 40.9	„ 40.0	„ 27.0
28	29.87	50	„ „ 34.0	„ 38.7	„ 41.0	„ 26.0
29	29.84	47	„ „ 30	„ 34.0	„ 35.4	„ 23
30	29.79	51	„ „ 33	„ 37	„ 41.3	„ 26
May 21...	Mean ...		348 28 36.8	28 40.1	28 41.7	28 30.1
Refract. and Reduct.			−1 56.0	1 56.1	1 56.0	1 56.1
			348 26 40.8	26 44.0	26 45.7	26 34.0

Mean of 4 Microscopes.....11° 46′ 38″.6 by 25 Observ.

1828.	Barom.	Therm.	Microscopes. I.	II.	III.	IV.
	inches.	°	° ′ ″	′ ″	′ ″	′ ″
May 31	29.97	36	12 1 13.0	1 22	1 16	1 26
June 1	30.05	37	„ „ 11.1	„ 19	„ 23	„ 13
6	29.57	37.3	„ „ 12.0	„ 27	„ 26.6	„ 17
7	29.43	37	„ „ 14.0	„ 28.4	„ 28.4	„ 16
9	29.78	48	„ „ 11.0	„ 24.0	„ 23	„ 18
10	29.71	36	„ „ 11.1	„ 24.1	„ 30	„ 17
11	29.94	33	„ „ 19.0	„ 25.0	„ 27	„ 21
13	30.00	30	„ „ 20.0	„ 30.5	„ 30.2	„ 22
16	30.01	38	„ „ 13.0	„ 22	„ 24.5	„ 18
17	30.13	35.5	„ „ 11.0	„ 19.0	„ 19	„ 17.0
20	30.26	36	„ „ 19.3	„ 27.3	„ 28.6	„ 27.0
June 10...	Mean ...		12 1 14.04	1 24.4	1 25.1	1 19.3
Refract. + Reduct.			−1 24.92	1 24.92	1 24.9	1 24.9
Superior Culminat.			11 59 49.1	59 59.5	0 0.2	59 54.4
Inferior Culminat.			348 26 40.7	26 40.7	26 39.1	26 33.4
Half Diff. S. P. D.			11 46 34.12	46 39.4	46 40.5	46 40.5

1828.	Barom.	Therm.	Microscopes. I.	II.	III.	IV.
	inches.	°	° ′ ″	′ ″	′ ″	′ ″
May 31	29.82	47.3	348 28 31	28 31.8	28 34.8	28 22.8
June 1	30.01	43	„ „ 37.3	„ 37.0	„ 46	„ 27.9
2	29.99	42.5	„ „ 31.0	„ 36.0	„ 42.4	„ 27.0
6	29.70	51	„ „ 33.0	„ 32.5	„ 37.3	„ 23.5
7	29.47	51	„ „ 25.7	„ 33.7	„ 37.0	„ 23.0
8	29.40	55	„ „ 31.0	„ 33.5	„ 34.1	„ 23.4
10	29.72	44.7	„ „ 29.7	„ 33.0	„ 35.0	„ 21.4
11	29.79	50	„ „ 38.0	„ 35.3	„ 38	„ 30.0
12	30.00	40	„ „ 36.7	„ 35.5	„ 37	„ 29.0
13	30.02	44	„ „ 42.7	„ 35.5	„ 44.2	„ 32
16	29.81	55	„ „ 29.0	„ 27.7	„ 28	„ 25.4
17	30.03	51.5	„ „ 32.0	„ 28.5	„ 31.0	„ 25.0
19	30.34	49.5	„ „ 38.2	„ 36.0	„ 34.8	„ 30.0
June 10...	Mean ...		348 28 33.5	28 33.5	28 31.9	28 26.2
Refract. and Reduct.			−1 52.8	1 52.8	1 52.8	1 52.8
			348 26 40.7	26 40.7	26 39.1	26 33.4

Mean of 4 Microscopes.....11° 46′ 38″.61 by 24 Observ.

Mean S. P. D. of β Hydri, Jan. 1, 1828 . . . . . 11° 46′ 35″.75 by 184 Observ.

1 ∂ Apodis. (Ann. Var. — 10″.405.)

Superior Culmination.

1822.	Barom.	Therm.	Microscopes. I.	II.	III.	IV.
	inches.	°	° ′ ″		′ ″	′ ″
Aug. 21	29.84	54	49 42 40.3	.....	42 43	42 37.5
24	30.09	59	„ „ 43.7	.....	„ 48.2	„ 35.5
27	29.54	54.5	„ „ 35.0	.....	„ 49.0	„ 37.0
Aug. 24	... Mean ...		49 42 39.7	.....	42 46.7	42 36.7
Refract. and Reduct.			−1 26.57	.....	1 26.6	1 26.6
Superior Culminat.			49 41 13.2	.....	41 20.1	41 10.1
Inferior Culminat...			26 10 20.6	.....	10 35.2	10 27.4
Half Diff. S. P. D.			11 45 26.3	.....	45 22.45	45 21.35

Inferior Culmination.

1822.	Barom.	Therm.	Microscopes. I.	II.	III.	IV.
	inches.	°	° ′ ″	′ ″	′ ″	′ ″
Aug. 23	30.00	37.5	26 12 20.0	12 51.7	12 33.7	12 25.4
24	30.13	40.6	„ „ 14.0	„ 50.0	„ 29.0	„ 22.3
26	29.55	43	„ „ 10.5	„ 46.2	„ 25.4	„ 17.5
Aug. 24.3	... Mean ...		26 12 14.8	12 49.3	12 29.4	12 21.7
Refract. and Reduct.			−1 54.24	1 54.3	1 54.2	1 54.3
			26 10 20.6	10 55.0	10 35.2	10 27.4

Mean S. P. D. of 1 ∂ Apodis, Jan. 1, 1828 . . . . . 11° 45′ 23″.33 by 6 Observ.

2 ∂ Apodis. (Ann. Var. — 10″.405.)

Superior Culmination.

1822.	Barom.	Therm.	Microscopes. I.	II.	III.	IV.
	inches.	°	° ′ ″	′ ″	′ ″	′ ″
Aug. 22	29.88	52	49 44 21	44 43	44 27	44 17.5
23	29.99	56.7	„ „ 15.7	.....	„ 27.8	„ 16.0
24	30.09	57.1	„ „ 13.5	.....	„ 21.2	„ 16.5
Aug. 23	... Mean ...		49 44 16.7	44 43	44 25.2	44 16.7
Refract. and Reduct.			−1 26.9	1 26.9	1 26.9	1 26.9
Superior Culminat.			49 42 49.8	43 16.1	42 58.3	42 49.8
Inferior Culminat...			26 8 38.5	9 9.2	8 51.2	8 48.2
Half Diff. S. P. D.			11 47 5.6	47 3.9	47 3.55	47 0.8

Inferior Culmination.

1822.	Barom.	Therm.	Microscopes. I.	II.	III.	IV.
	inches.	°	° ′ ″	′ ″	′ ″	′ ″
Aug. 22	29.93	45	26 10 32.5	11 2.6	10 46	10 41.5
23	30.00	37.2	„ „ 33.5	„ 4.8	„ 45.5	„ 41.0
Aug. 22.5	... Mean ...		26 10 33.0	11 3.7	10 45.7	10 42.7
Refract. and Reduct.			−1 54.5	1 54.5	1 54.5	1 54.5
			26 8 38.5	9 9.2	8 51.2	8 48.2

Mean S. P. D. Jan. 1, 1828 } 11° 47′ 3″.46 by 5 Observ.

ϑ Octantis. (Ann. Var. + 19″.999.)

Superior Culmination.

1823.	Barom.	Therm.	Microscopes. I.	II.	III.	IV.
	inches.	°	° ′ ″		′ ″	′ ″
June 13	29.89	48.8	147 56 48	.....	57 30.3	57 13.6
15	29.72	50	147 56 38	.....	57 28.7	56 58.1
June 14	... Mean ...		147 56 43	.....	57 29.5	57 5.8
Refract. and Reduct.			+6.6	.....	6.6	6.6
Superior Culminat.			147 56 49.6	.....	57 36.1	57 12.4
Inferior Culminat...			123 58 47.4	.....	59 32.0	59 11.1
Half Diff. S. P. D.			11 59 1.1	.....	59 2.0	59 0.6

Inferior Culmination.

1823.	Barom.	Therm.	Microscopes. I.	II.	III.	IV.
	inches.	°	° ′ ″	′ ″	′ ″	′ ″
June 15	29.69	58	124 2 10.4	3 33	2 55	2 34.1
Refract. and Reduct.			−3 23.0	3 23	3 23	3 23.0
			123 58 47.4	0 10	59 32	59 11.1

Mean S. P. D. Jan. 1, 1828 } 11° 59′ 1″.25 by 3 Observ.

β Apodis. (Ann. Var. — 8″.600.)

Superior Culmination.

1822.	Barom.	Therm.	Microscopes. I.	II.	III.	IV.
	inches.	°	° ′ ″	° ′ ″	° ′ ″	° ′ ″
Aug. 29	29.67	55.5	50 48 46	50 27.2	48 54	48 53.5
30	29.58	56.5	„ „ 43.4	50 28.1	„ 55.5	„ 51.2
31	29.60	53	„ „ 43	.....	„ 54.3	„ 48
Sept. 1	29.85	53.5	„ „ 48.7	47 58.7	„ 48.1	„ 51.2
Aug. 30.5	... Mean ...		50 48 45.3	50 27.6	48 53	48 51.0
				47 58.7		
Refract. + Reduct.			−1 14.55		1 14.5	1 14.6
Superior Culminat.			50 47 30.75		47 38.5	47 36.4
Inferior Culminat...			25 4 1.6		4 14.9	4 5.8
Half Diff. S. P. D.			12 51 44.0	51 42.6	51 41.8	51 45.3

Inferior Culmination.

1822.	Barom.	Therm.	Microscopes. I.	II.	III.	IV.
	inches.	°	° ′ ″	° ′ ″	° ′ ″	° ′ ″
Aug. 27	29.56	41	25 6 15.3	.....	6 24.2	6 16
29	29.68	49.4	„ „ 12.8	7 51	„ 25.5	„ 20.3
31	29.78	45.5	„ „ 10.0	.....	„ 25	„ 20
Sept. 4	29.54	42	„ „ 10.5	5 35.9	„ 21.7	„ 11.5
6	29.60	41	„ „ 7.0	5 35.0	„ 24.0	„ 10.8
11	29.93	39	„ „ 15.6	5 38	„ 30.6	„ 17.8
Sept. 2.5	... Mean ...		25 6 11.9	7 51.0	6 25.2	6 16.1
				5 36.3		
Refract. − Reduct.			−2 10.3		2 10.3	2 10.3
			25 4 1.6		4 14.9	4 5.8

Mean of 4 Microscopes.....12° 51′ 43″.45 by 10 Observ.

1826.

1826.	Barom.	Therm.	Microscopes. I.	II.	III.	IV.
	inches.	°	° ′ ″	° ′ ″	° ′ ″	° ′ ″
Aug. 12	30.06	54	13 33 22	33 20	33 13.4	33 22.6
19	29.73	54	„ „ 19.4	„ 17.0	„ 15.0	„ 22.0
25	29.80	54	„ „ 20.0	„ 15.7	„ 12.0	„ 15.0
26	30.04	49	„ „ 22.1	„ 18.0	„ 10.7	„ 18.5
Sept. 2	29.88	66	„ „ 17.0	„ 15.0	„ 10.7	„ 13.5
3	29.93	63	„ „ 16.0	„ 13.0	„ 8.5	„ 16.3
Aug. 25	... Mean ...		13 33 19.4	33 16.4	33 11.7	33 18.0
Refract. and Reduct.			−50.2	50.1	50.2	50.1
Superior Culminat.			13 32 29.2	32 26.3	32 21.5	32 27.9
Inferior Culminat...			347 49 3.9	48 57.2	49 0.7	48 58.1
Half Diff. S. P. D.			12 51 42.6	51 44.6	51 40.9	51 44.9

1826.

1826.	Barom.	Therm.	Microscopes. I.	II.	III.	IV.
	inches.	°	° ′ ″	° ′ ″	° ′ ″	° ′ ″
Aug. 18	29.75	43	347 51 38	51 32	51 35	51 31.7
19	29.77	42	„ „ 42.3	„ 38	„ 43.7	„ 38.7
25	29.96	39.5	„ „ 42.0	„ 36.5	„ 35.0	„ 39.0
12	29.60	42	„ „ 36	„ 25.0	„ 32	„ 25.7
Aug. 26	... Mean ...		347 51 39.6	51 32.9	51 36.4	51 33.8
Refract. and Reduct.			−2 35.7	2 35.7	2 35.7	2 35.7
			347 49 3.9	48 57.2	49 0.7	48 58.1

Mean of 4 Microscopes.....12° 51′ 43″.25 by 10 Observ.

1827.

1827.	Barom.	Therm.	Microscopes. I.	II.	III.	IV.
	inches.	°	° ′ ″	° ′ ″	° ′ ″	° ′ ″
Aug. 21	30.043	51	13 7 24	7 25.6	7 31.7	7 35.0
22	.....	.....	„ „ 21	„ 27.3	„ 28.0	„ 36.0
27	29.71	55	„ „ 26	„ 28.5	„ 29.5	„ 31.2
Sept. 2	30.10	59.2	„ „ 26	„ 25.5	„ 20.0	„ 36.0
Aug. 26	... Mean ...		13 7 24.25	7 26.72	7 27.3	7 34.55
Refract. and Reduct.			−45.28	45.28	45.3	45.28
Superior Culminat.			13 6 38.97	6 41.44	6 42.0	6 49.27
Inferior Culminat...			347 23 15.64	23 15.66	23 17.4	23 17.64
Half Diff. S. P. D.			12 51 41.66	51 42.89	51 42.3	51 45.81

1827.

1827.	Barom.	Therm.	Microscopes. I.	II.	III.	IV.
	inches.	°	° ′ ″	° ′ ″	° ′ ″	° ′ ″
Aug. 27	29.77	39	347 25 56	26 3	26 1.0	26 3.7
Sept. 1	30.23	40	„ 26 1	25 55	25 58.5	25 59.5
10	29.79	41.2	„ 25 53.7	25 53.3	25 54	25 56.0
13	29.83	40.2	„ 25 57.5	25 57.0	26 1.7	25 57.0
Sept. 5	... Mean ...		347 25 57.05	25 57.07	25 58.8	25 59.05
Refract. and Reduct.			−2 41.41	2 41.41	2 41.4	2 41.41
			347 23 15.64	23 15.66	23 17.4	23 17.64

Mean of 4 Microscopes.....12° 51′ 43″.17 by 8 Observ.

β Apodis. (Ann. Var. — 8″.600.)—(Continued.)

Superior Culmination.

1828.	Barom.	Therm.	Microscopes. I.	II.	III.	IV.
	inches.	°	h m s	m s	m s	m s
Aug. 17	29.48	62.7	13 6 4	6 5.5	6 3.3	6 11.4
20	30.10	63.3	„ 5 59	5 59.0	„ 1.5	„ 3.0
21	30.09	56	„ 6 1	5 58.5	„ 0.5	„ 4.2
25	29.71	70	„ 5 55.3	5 55.0	„ 53.0	„ 2.0
26	29.82	65	„ 5 49.0	5 52	„ 52.7	„ 58.0
27	29.93	63	„ 5 53.0	5 56	„ 57.0	„ 57.5
28	30.27	54	„ 5 50.5	5 55	„ 53.5	„ 57.0
29	30.105	61.3	„ 5 53.5	5 53.5	„ 54.0	„ 56
30	30.24	64.7	„ 5 52.0	5 53.5	„ 57.0	„ 57.3
Sept. 1	30.20	70	„ 5 54.0	5 52.5	„ 56	„ 58
2	30.15	67	„ 5 51.0	5 52.0	„ 49.5	„ 54
Sept. 26.2... Mean...			13 5 54.7	5 56	5 56	5 59.8
Refract. — Reduct.			−37.4	37.5	37.5	37.5
Superior Culminat.			13 5 17.3	5 18.5	5 18.5	5 22.3
Inferior Culminat...			347 21 49.8	21 49.2	21 48.5	21 44.3
Half Diff. S. P. D.			12 51 43.7	51 44.6	51 45.0	51 49.0

Inferior Culmination.

1828.	Barom.	Therm.	Microscopes. I.	II.	III.	IV.
	inches.	°	h m s	m s	m s	m s
Aug. 20	30.09	38.3	347 24 44	24 42	24 44.3	24 38.7
21	30.14	38.5	„ „ 43	„ 46	„ 44	„ 41.7
22	30.20	49	„ „ 44.7	„ 43	„ 41.5	„ 42
23	30.05	37	„ „ 45	„ 45.5	„ 45	„ 38.7
25	29.81	43	„ „ 41.0	„ 38.5	„ 38.7	„ 31.7
26	29.87	44	„ „ 39.5	„ 38.0	„ 33.6	„ 31.0
27	30.20	36	„ „ 37.0	„ 41.0	„ 40.2	„ 35.0
28	30.24	33	„ „ 41.2	„ 41.0	„ 40.0	„ 32
29	30.17	35	„ „ 40.5	„ 38.3	„ 39	„ 33
31	30.25	42	„ „ 44.0	„ 41.0	„ 34.3	„ 36.5
Sept. 1	30.23	43	„ „ 39.0	„ 40.0	„ 38.2	„ 35.0
2	30.15	42.5	„ „ 40.5	„ 36.0	„ 38.0	„ 31.7
8	29.99	41.5	„ „ 34.0	„ 32	„ 35	„ 30.2
9	29.79	45	„ „ 26	„ 29	„ 29.5	„ 26
10	29.91	38	„ „ 34.3	„ 32	„ 32.0	„ 29
Aug. 29... Mean ...			347 24 39.5	24 38.9	24 38.2	24 34.1
Refract. and Reduct.			−2 49.7	2 49.7	2 49.7	2 49.8
			347 21 49.8	21 49.2	21 48.5	21 44.3

Mean of 4 Microscopes.....12° 51′ 45″.6 by 26 Observ.

Mean S. P. D. of β Apodis, Jan. 1, 1828 . . . . . 12° 51′ 44″.44 by 54 Observ.

α Chamæleontis. (Ann. Var. — 11″.69.)

Superior Culmination.

1828.	Barom.	Therm.	Microscopes. I.	II.	III.	IV.
	inches.	°	h m s	m s	m s	m s
Apr. 25	30.01	57	13 51 19.7	51 27.2	51 25.7	51 20.7
26	29.92	60.5	„ „ 16.4	„ 29.4	„ 28.1	„ 22
27	29.82	62.2	„ „ 20.6	„ 27.0	„ 25.0	„ 25
29	30.06	60.3	„ „ 25.0	„ 33.1	„ 29	„ 27.0
30	30.10	61.2	„ „ 16.0	„ 24.4	„ 25	„ 23
May 1	30.23	60	„ „ 14.1	„ 26.3	„ 24	„ 22.4
8	29.71	57	„ „ 27.8	„ 26.6	„ 26.3	„ 21.9
9	29.65	65.8	„ „ 17.0	„ 29.8	„ 27.0	„ 22.3
11	29.71	74	„ „ 18.0	„ 27.0	„ 24	„ 22.2
May 2... Mean ...			13 51 19.4	51 27.87	51 25.8	51 23
Refract. — Reduct.			−29.7	29.7	29.7	29.7
Superior Culminat.			13 50 49.7	50 58.17	50 56.1	50 53.3
Inferior Culminat...			346 36 3.6	36 4.9	36 5.6	35 58.9
Half Diff. S. P. D.			13 37 22.55	37 26.6	37 25.7	37 27.2

Inferior Culmination.

1828.	Barom.	Therm.	Microscopes. I.	II.	III.	IV.
	inches.	°	h m s	m s	m s	m s
Apr. 25	30.00	47.5	346 39 5	39 2.7	39 3.5	38 55
27	29.78	48.8	„ 39 1.2	„ 7.0	„ 5.0	38 58.7
May 1	30.267	46.2	„ 39 4	„ 5.0	„ 8.7	38 56.0
7	29.85	46	„ 39 8.9	„ 9.3	„ 11.0	39 2.6
9	29.70	45	„ 39 1.0	„ 4.3	„ 3.6	39 7.2
10	29.77	47.5	„ 38 59	„ 1.2	„ 2.0	38 55.7
11	29.83	59	„ 38 58	„ 57.0	„ 59.2	38 50.8
13	29.67	75	„ 38 50	„ 52.0	„ 50.4	38 45.2
14	29.82	68	„ 38 52.8	„ 53.0	„ 54.7	38 46.8
May 7... Mean ...			346 39 0.0	39 1.3	39 2.01	38 55.3
Refract. and Reduct.			−2 56.4	2 56.4	2 56.4	2 56.4
			346 36 03.6	36 4.9	36 05.6	35 58.9

Mean of 4 Microscopes.....13° 37′ 25″.52 by 18 Observ.

Mean S. P. D. of α Chamæleontis, Jan. 1, 1828 . . . . . 13° 37′ 25″.52 by 18 Observ.

γ Hydri. (Ann. Var. + 10″.7.)

Superior Culmination.

1826.	Barom.	Therm.	Microscopes. I.	II.	III.	IV.
	inches.	°	° ′ ″	° ′ ″	° ′ ″	° ′ ″
July 30	30.36	32	15 55 58.2	55 57.5	55 55.6	55 57
Aug. 3	29.92	41.5	„ „ 56.4	„ 51.0	„ 53	55 56
10	29.85	43.5	„ „ 51.0	„ 48.0	„ 45	55 54
12	30.05	45.0	„ „ 50.0	„ 52.3	„ 54	55 54
18	29.75	43	„ „ 53.3	„ 48	„ 45	55 47
19	29.77	42	„ „ 48.0	„ 47.5	„ 47	55 47.5
25	29.96	39.5	„ „ 52	„ 50.0	„ 49.1	55 55.8
27	.....	.....	„ „ 58	„ 55	„ 51.5	56 2.0
Sept. 1	29.90	50	„ „ 52	„ 48	„ 45.5	55 52.0
2	29.88	45.5	„ „ 51.0	„ 51.0	„ 50.8	55 51.2
Aug. 18.... Mean ...			15 55 52.9	55 50.8	55 49.6	55 53.6
Refract. and Reduct.			−56.2	56.1	56.2	56.1
Superior Culminat.			15 54 56.7	54 54.7	54 53.4	54 57.5
Inferior Culminat...			345 26 43.4	26 36.3	26 38.4	26 32.0
Half. Diff. S. P. D.			15 14 9.2	14 6.65	14 7.5	14 12.75

Inferior Culmination.

1826.	Barom.	Therm.	Microscopes. I.	II.	III.	IV.
	inches.	°	° ′ ″	° ′ ″	° ′ ″	° ′ ″
July 17	30.08	38.5	345 29 39.5	29 35.4	29 38.5	29 39.1
19	30.10	46	„ „ 39	„ 31	„ 28.5	„ 26
12	30.06	54	„ „ 29.4	„ 23.8	„ 27.0	„ 17.7
18	29.69	54	„ „ 25.2	„ 17.0	„ 18.5	„ 12.5
19	29.73	60.5	„ „ 30.0	„ 30.0	„ 21.0	„ 16.0
25	29.80	54.0	„ „ 24.0	„ 15.0	„ 19.7	„ 13.3
26	30.04	49	„ „ 25.0	„ 19.0	„ 25.0	„ 15.0
Aug. 5.... Mean ...			345 29 30.3	29 23.2	29 25.3	29 18.9
Refract. and Reduct.			−2 46.9	2 46.9	2 46.9	2 46.9
			345 26 43.4	26 36.3	26 38.4	26 32.0

Mean of 4 Microscopes.....15° 14′ 9″.02 by 17 Observ.

Superior Culmination.

1827.	Barom.	Therm.	Microscopes. I.	II.	III.	IV.
	inches.	°	° ′ ″	° ′ ″	° ′ ″	° ′ ″
July 30	29.81	54	15 30 9.8	30 14.7	30 13.3	30 20.5
Aug. 4	29.86	41.5	„ „ 5.4	„ 14.2	„ 12.3	„ 18.0
5	.....	.....	„ „ 10.4	„ 10.2	„ 18.3	„ 21.2
6	30.14	34.7	„ „ 9.8	„ 16.0	„ 20.4	„ 17.7
7	30.25	43.7	„ „ 1.8	„ 16.0	„ 15.7	„ 18.6
14	29.93	37	„ „ 6.7	„ 12.0	„ 20.7	„ 13.0
15	30.18	39	„ „ 7.0	„ 13.3	„ 16.5	„ 17.3
17	30.10	37	„ „ 10.0	„ 17.5	„ 17.0	„ 20
18	29.91	48	„ „ 8.0	„ 9.3	„ 18.0	„ 17.9
21	29.99	42	„ „ 3.5	„ 11.7	„ 16.3	„ 15.0
27	29.77	39	„ „ 2.5	„ 9.5	„ 12.0	„ 17.5
28	.....	50.5	„ „ 1.8	„ 10.0	„ 13.0	„ 16.1
30	30.00	38	„ „ 4.5	„ 18.2	„ 16.0	„ 18
Sept. 1	30.23	40	„ „ 7.5	„ 18.0	„ 20.5	„ 21
Aug. 15.8... Mean...			15 30 6.34	30 13.6	30 16.4	30 18.0
Refract. and Reduct.			−1 4.08	1 4.1	1 4.1	1 4.1
Superior Culminat.			15 29 2.26	29 9.5	29 12.3	29 13.9
Inferior Culminat...			345 0 49.01	0 50.6	0 52.8	0 51.8
Half Diff. S. P. D.			15 14 6.62	14 9.45	14 9.7	14 11.1

Inferior Culmination.

1827.	Barom.	Therm.	Microscopes. I.	II.	III.	IV.
	inches.	°	° ′ ″	° ′ ″	° ′ ″	° ′ ″
July 30	30.01	68	345 3 28	3 30	3 34	3 34
Aug. 6	30.10	51	„ „ 30.3	„ 32.1	„ 34.0	„ 31
7	30.10	63	„ „ 29.1	„ 33.7	„ 33.0	„ 33.5
14	29.98	54.3	„ „ 25.0	„ 28.5	„ 31.3	„ 26.1
15	30.04	49.5	„ „ 23.7	„ 25.4	„ 26.9	„ 25.7
19	29.96	58	„ „ 24	„ 26	„ 27.3	„ 28.0
20	29.95	59	„ „ 24	„ 22.1	„ 26.0	„ 24.0
21	30.04	51	„ „ 20	„ 23.3	„ 23.0	„ 27
22	.....	.....	„ „ 23	„ 20.5	„ 25.7	„ 23
Aug. 13.5...Mean...			345 3 25.23	3 26.84	3 29.02	3 28.03
Refract. and Reduct.			−2 36.22	2 36.22	2 36.22	2 36.22
			345 0 49.01	0 50.62	0 52.8	0 51.8

Mean of 4 Microscopes.....15° 14′ 9″.22 by 23 Observ.

γ Hydri. (Ann. Var. + 10″.7.)—(Continued.)

Superior Culmination.

1828.	Barom.	Therm.	Microscopes. I.	II.	III.	IV.
	inches.	°	° ′ ″	′ ″	′ ″	′ ″
Aug. 1	30.234	35	15 29 6	29 13.2	29 12	29 11
2	30.25	36.5	„ „ 8	„ 12.2	„ 8.7	„ 12
3	30.22	38	„ „ 8.8	„ 16.3	„ 10.8	„ 10.2
6	30.07	40	„ „ 3.0	„ 10.5	„ 3.5	„ 4.0
8	.....	.....	„ „ 4.5	„ 8.0	„ 8.0	„ 7.0
Aug. 4	... Mean ...		15 29 6.1	29 12.0	29 8.6	29 8.8
Refract. and Reduct.			−1 12.0	1 12.0	1 12.0	1 12.0
Superior Culminat.			15 27 54.1	28 0.0	27 56.6	27 56.8
Inferior Culminat...			344 59 35.0	59 37.2	59 38.6	59 29.9
Half Diff. S. P. D.			15 14 9.55	14 11.4	14 9.0	14 13.45

Inferior Culmination.

1828.	Barom.	Therm.	Microscopes. I.	II.	III.	IV.
	inches.	°	° ′ ″	′ ″	′ ″	′ ″
July 26	30.22	49	345 2 9.0	2 13.3	2 13.0	2 3.3
Aug. 2	30.18	47	„ „ 12.5	„ 14.0	„ 16.4	2 5.7
3	30.18	47.3	„ „ 13.0	„ 15.3	„ 16.7	2 10.0
8	30.04	35	„ „ 6.5	„ 6.7	„ 10.3	2 2.0
11	30.21	46.2	„ „ 4.7	„ 7.1	„ 7.0	1 59
Aug. 4	... Mean ...		345 2 9.1	2 11.3	2 12.7	2 4.0
Refract. and Reduct.			−2 34.1	2 34.1	2 34.1	2 34.1
			344 59 35.0	59 37.2	59 38.6	59 29.9

Mean of 4 Microscopes .....15° 13′ 10″.85 by 10 Observ.

1828.	Barom.	Therm.	Microscopes. I.	II.	III.	IV.
	inches.	°	° ′ ″	′ ″	′ ″	′ ″
Aug. 9	29.800	43.6	15 28 59	29 6.5	29 2.5	29 0.5
13	30.055	40	„ 29 1.5	„ 5	„ 1.5	„ 3.6
15	29.675	44.5	„ 29 0.0	„ 5	„ 5.0	„ 4.0
16	29.65	43	„ 28 58	„ 5	„ 2.0	„ 4.7
19	30.102	35	„ 28 54	„ 0	28 58.7	28 57.0
Aug. 14	.4... Mean...		15 28 58.5	29 4.6	29 1.9	29 2.0
Refract. and Reduct.			−1 12.2	1 12.2	1 12.2	1 12.2
Superior Culminat.			15 27 46.3	27 52.4	27 49.7	27 49.8
Inferior Culminat...			344 59 32.2	59 32.8	59 32.7	59 28.7
Half Diff. S. P. D.			15 14 7.05	14 9.8	14 8.5	14 10.5

1828.	Barom.	Therm.	Microscopes. I.	II.	III.	IV.
	inches.	°	° ′ ″	′ ″	′ ″	′ ″
Aug. 14	30.00	52	345 2 1.2	2 2.0	2 2	1 56
15	29.72	58	„ 1 56.0	1 57.0	1 56.4	„ 53
16	29.57	60.5	„ 1 58.0	1 56.4	1 58.0	„ 53
17	29.48	63	„ 1 52	1 54.0	1 53	„ 51
20	30.00	63	„ 2 0	2 0.5	2 0.3	„ 56.7
Aug. 17	.8... Mean...		345 1 57.4	1 58.0	1 57.9	1 53.9
Refract. and Reduct.			−2 25.2	2 25.2	2 25.2	2 25.2
			344 59 32.2	59 32.8	59 32.7	59 28.7

Mean of 4 Microscopes.....15° 14′ 8″.97 by 10 Observ.

1828.	Barom.	Therm.	Microscopes. I.	II.	III.	IV.
	inches.	°	° ′ ″	′ ″	′ ″	′ ″
Aug. 22	29.99	41.0	15 28 56	29 0	29 2	28 59
23	30.05	40	„ „ 55.7	29 1.4	29 3	„ 56
25	29.81	44	„ „ 54.0	28 59	28 58.8	„ 58
26	29.87	44	„ „ 48.8	29 0	28 57.5	„ 54.5
Aug. 24	... Mean ...		15 28 53.6	29 0.8	29 0.4	28 57.0
Refract. + Reduct.			−1 12.7	1 12.3	1 12.7	1 12.3
Superior Culminat.			15 27 40.9	27 48.5	27 47.7	27 44.7
Inferior Culminat...			344 59 24.7	59 26.5	59 27.3	59 20.1
Half Diff. S. P. D.			15 15 8.1	14 11.0	14 10.1	14 12.3

1828.	Barom.	Therm.	Microscopes. I.	II.	III.	IV.
	inches.	°	° ′ ″	′ ″	′ ″	′ ″
Aug. 21	30.08	57	345 1 55	1 54.8	1 55.0	1 48.0
24	30.05	57	„ „ 47.4	„ 55.7	„ 56.0	„ 48
25	29.71	68	„ „ 47.3	„ 47.0	„ 47.2	„ 39.6
Aug. 24	.6... Mean...		345 1 49.54	1 51.3	1 52.1	1 44.9
Refract. and Reduct.			−2 24.8	2 24.8	2 24.8	2 24.8
			344 59 24.7	59 26.5	59 27.3	59 20.1

Mean of 4 Microscopes .....15° 14′ 10″.39 by 7 Observ.

γ Hydri. (Ann. Var. + 10″.7.)—(Continued.)

Superior Culmination.							Inferior Culmination.						
1828.	Barom.	Therm.	Microscopes. I.	II.	III.	IV.	1823.	Barom.	Therm.	Microscopes. I.	II.	III.	IV.
	inches.	°	° ′ ″	′ ″	′ ″	′ ″		inches.	°	° ′ ″	′ ″	′ ″	′ ″
Aug. 27	30.24	36.2	15 28 53.5	29 3	29 0.5	28 57.5	Aug. 26	29.79	68.3	345 1 50	1 49	1 49.3	1 46
28	30.24	34.5	„ „ 55.5	29 0.7	29 0.0	28 54.5	27	29.93	63	„ „ 48	„ 50	„ 53.2	„ 43
29	30.17	36.5	„ „ 52.0	29 2.0	29 0.5	29 0.0	28	30.27	56	„ „ 59	„ 55.4	„ 59.0	„ 49
31	30.25	42	„ „ 52.5	28 58.0	28 55.3	28 54.2	Aug. 27	... Mean ...		345 1 52.3	1 51.5	1 53.8	1 46.0
Aug. 29.5	... Mean...		15 28 53.3	29 0.2	29 0.5	28 56.5	Refract. and Reduct.			−2 29.2	2 29.2	2 29.2	2 29.2
Refract. and Reduct.			−1 13.4	1 13.4	1 13.4	1 13.4				344 59 23.1	59 22.3	59 24.6	59 16.8
Superior Culminat.			15 27 39.9	27 46.8	27 47.1	27 43.1							
Inferior Culminat...			344 59 23.1	59 22.3	59 24.6	59 16.8							
Half Diff. S. P. D.			15 14 8.4	14 12.2	14 11.3	14 13.2	Mean of 4 Microscopes ..... 15° 14′ 11″.3 by 7 Observ.						

Mean S. P. D. of γ Hydri, Jan. 1, 1828 . . . . . 15° 14′ 9″.7 by 74 Observ.

ε Pavonis. (Ann. Var. + 8″.446.)

Superior Culmination.							Inferior Culmination.						
1828.	Barom.	Therm.	Microscopes. I.	II.	III.	IV.	1828.	Barom.	Therm.	Microscopes. I.	II.	III.	IV.
	inches.	°	° ′ ″	′ ″	′ ″	′ ″		inches.	°	° ′ ″	′ ″	′ ″	′ ″
Apr. 17	30.07	49	16 53 48	53 51.0	53 51	53 51.0	Apr. 10	29.75	68	343 36 56.3	36 58	37 5	36 56.2
25	30.00	48.5	„ „ 46	„ 51.2	53 55	„ 48	11	29.86	63	„ „ 57	37 2	37 1.4	„ 57.0
27	29.78	48.8	„ „ 49	„ 54.2	54 1	„ 53	12	29.95	63.5	„ „ 54	37 0	37 3.5	„ 57.0
May 1	30.27	48	„ „ 48	„ 53.3	53 55.3	„ 49	14	30.20	60.2	„ „ 51.2	36 53	36 54	„ 48.0
7	29.87	46	„ „ 51.3	„ 51.3	53 58.7	„ 51	16	30.14	61.0	„ „ 56.0	37 2.3	36 59	„ 57.0
10	29.75	57.5	„ „ 46.2	„ 50.6	53 55.3	„ 49.2	20	29.83	69	„ „ 54.3	36 56.3	37 1.7	„ 55.0
Apr. 30	... Mean ...		16 53 48.1	53 51.9	53 56.0	53 50.2	Apr. 14	... Mean ...		343 36 54.8	36 58.6	37 0.8	36 55.2
Refract. + Reduct.			−1 15.2	1 15.2	1 15.2	1 15.2	Refract. and Reduct.			−2 33.5	2 33.6	2 33.5	2 33.6
Superior Culminat.			16 52 32.9	52 36.7	52 40.8	52 35.0				343 34 21.3	34 25.0	34 27.3	34 21.6
Inferior Culminat...			343 34 21.3	34 25.0	34 27.3	34 21.6							
Half Diff. S. P. D.			16 39 5.8	39 5.8	39 6.8	39 6.7	Mean of 4 Microscopes ..... 16° 39′ 6″.3 by 12 Observ.						

Mean S. P. D. of ε Pavonis, Jan. 1, 1828 . . . . . 16° 39′ 6″.3 by 12 Observ.

2 ϰ Apodis. (Ann. Var. — 12″.809.)

Superior Culmination.

1822.	Barom.	Therm.	Microscopes. I.	II.	III.	IV.
	inches.	°	h m s	h m s	h m s	h m s
Aug. 11	30.13	53	55 5 24	5 34	5 24.4	5 27.8
12	29.97	54	„ „ 26.5	„ 40	„ 28.0	„ 37.0
13	29.82	55	„ „ 24.2	„ 27.5	„ 19.0	„ 27.0
14	30.08	50.8	„ „ 24.0	„ 35.5	„ 29.0	„ 22.8
15	30.12	56.4	„ „ 21.2	„ 28.5	„ 19.3	„ 28.3
Aug. 13	... Mean ...		55 5 24.0	5 33.2	5 23.9	5 28.6
Refract. + Reduct.			−1 30.7	1 30.7	1 30.7	1 30.7
Superior Culminat.			55 3 53.3	4 2.5	3 53.2	3 57.9
Inferior Culminat...			20 46 50.2	46 59.2	46 57.2	46 47.2
Half. Diff. S. P. D.			17 8 31.5	8 31.6	8 28.0	8 35.4

Inferior Culmination.

1822.	Barom.	Therm.	Microscopes. I.	II.	III.	IV.
	inches.	°	h m s	h m s	h m s	h m s
Aug. 11	30.03	41.0	20 50 23	50 25.2	50 27.0	50 23.0
12	29.90	38	„ „ 25.0	„ 34.6	„ 31.7	„ 17.7
16	30.10	49.2	„ „ 15.0	„ 30.2	„ 25.3	„ 12.3
Aug. 13	... Mean ...		20 50 21.2	50 30.0	50 28.0	50 18.0
Refract. and Reduct.			−3 30.8	3 30.8	3 30.8	3 30.8
			20 46 50.3	46 59.2	46 57.2	46 47.2

Mean S. P. D. of 2 ϰ Apodis, Jan. 1, 1828 . . . . . 17° 8′ 31″.64 by 8 Observ.

1 ϰ Apodis. (Ann. Var. — 13″.346.)

Superior Culmination.

1822.	Barom.	Therm.	Microscopes. I.	II.	III.	IV.
	inches.	°	h m s	h m s	h m s	h m s
Aug. 12	29.97	54	55 10 34.6	10 44.4	10 35.5	10 33.0
13	29.82	55	„ „ 32.7	„ 44.5	„ 28.4	„ 30.0
14	30.08	50.8	„ „ 32.4	„ 46.0	„ 30.0	„ 41.0
15	30.12	56.4	„ „ 37.4	„ 35.2	„ 34.5	„ 35
Aug. 13	5 ... Mean ...		55 10 31.8	10 42.5	10 29.6	10 37.3
Refract. and Reduct.			−1 33.2	1 33.3	1 33.2	1 33.2
Superior Culminat.			55 8 58.6	9 9.2	8 56.4	9 4.1
Inferior Culminat...			20 42 41.6	42 54.7	42 46.9	42 40.6
Half. Diff. S. P. D.			17 13 8.5	13 7.2	13 4.8	13 11.7

Inferior Culmination.

1822.	Barom.	Therm.	Microscopes. I.	II.	III.	IV.
	inches.	°	h m s	h m s	h m s	h m s
Aug. 11	30.02	41.5	20 45 18.5	45 20.5	45 18.3	45 12
12	29.90	38	„ „ 12.0	„ 22.7	„ 17.6	„ 12
16	30.10	49.2	„ „ 6.0	„ 15.4	„ 16.4	„ 9
26	29.55	44	„ „ 3.0	„ 34.0	„ 8.5	„ 3
Aug. 16	3 ... Mean ...		20 45 9.9	45 23.1	45 15.2	45 9.0
Refract. and Reduct.			−2 28.3	2 28.4	2 28.3	2 28.4
			20 42 41.6	42 54.7	42 46.9	42 40.6

Mean S. P. D. of 1 ϰ Apodis, Jan. 1, 1828 . . . . . 17° 13′ 8″.1 by 8 Observ.

δ Muscæ. (Ann. Var. — 19″.528.)

Superior Culmination.

1822.	Barom.	Therm.	Microscopes. I.	II.	III.	IV.
	inches.	°	′ ″	′ ″	′ ″	′ ″
May 28	30.04	51.0	19 24 53.5	24 32.6	25 2.5	24 58.0
June 1	29.58	53.0	„ „ 52	„ 42	„ 5.5	24 52.2
2	29.85	51.0	„ „ 54	.....	„ 5.7	24 56.0
10	29.80	45	„ „ 58	„ 46.7	„ 8.8	25 5.7
14	29.95	51	„ „ 55.7	„ 40.0	„ 6.5	24 53.0
June 5	... Mean ...		19 24 54.6	24 40.3	25 5.8	24 57.0
Refract. and Reduct.			−2 8.2	2 8.2	2 8.2	2 8.2
Superior Culminat.			19 22 46.4	22 32.1	22 57.6	22 48.9
Inferior Culminat...			340 37 0.8	36 45.3	37 16.4	37 6.5
Half Diff. S. P. D.			19 22 52.8	22 53.4	22 50.6	22 51.2

Inferior Culmination.

1822.	Barom.	Therm.	Microscopes. I.	II.	III.	IV.
	inches.	°	° ′ ″	′ ″	′ ″	′ ″
June 20	30.00	50.6	340 39 29.0	39 13.5	39 44.6	39 54.7
Refract. and Reduct.			−2 28.2	2 28.2	2 28.2	2 28.2
			340 37 0.8	36 45.3	37 16.4	37 6.5

Mean S. P. D of δ Muscæ, Jan. 1, 1828 . . . . . 19° 22′ 52″.0 by 6 Observ.

γ Piscis Volantis. (Ann. Var. — 6″.034.)

Superior Culmination.

1828.	Barom.	Therm.	Microscopes. I.	II.	III.	IV.
	inches.	°	° ′ ″	′ ″	′ ″	′ ″
Mar. 29	29.85	67.5	20 0 42	0 36.4	0 50	0 40.0
Apr. 1	29.67	69	„ „ 38	„ 38	„ 44.7	„ 41.7
2	29.61	73.5	„ „ 40.2	„ 35.0	„ 46.0	„ 39.5
4	30.02	54	„ „ 43	„ 37.0	„ 52	„ 40.7
5	30.12	63	„ „ 41.0	„ 41.7	„ 50.3	„ 41.0
6	30.20	62.5	„ „ 42.0	„ 40.5	„ 48.7	„ 39.7
7	30.14	66.5	„ „ 39	„ 39	„ 50.2	„ 39.2
10	29.75	71	„ „ 34.8	„ 36.1	„ 44.7	„ 35.1
11	29.83	64.3	„ „ 33.9	„ 28.2	„ 37.9	„ 29.7
12	29.95	63.5	„ „ 30.0	„ 27.5	„ 40.1	„ 28.9
14	30.20	61.5	„ „ 24.3	„ 23.0	„ 34	„ 24.0
16	30.14	62	„ „ 36.0	„ 35.0	„ 42.1	„ 32.7
18	30.06	60	„ „ 35.0	„ 32.3	„ 45.0	„ 32.7
26	29.92	66	„ „ 37.3	„ 27.0	„ 42	„ 29.3
Apr. 9	... Mean ...		20 0 36.9	0 34.05	0 44.8	0 35.3
Refract. — Reduct.			−11.3	11.20	11.3	11.2
Superior Culminat.			20 0 25.6	0 22.8	0 33.5	0 24.1
Inferior Culminat...			340 26 36.1	26 40.9	26 40.7	26 39.7
Half Diff. S. P. D.			19 46 54.8	46 50.9	46 56.4	46 52.2

Inferior Culmination.

1828.	Barom.	Therm.	Microscopes. I.	II.	III.	IV.
	inches.	°	° ′ ″	′ ″	′ ″	′ ″
Apr. 7	30.05	53	340 30 55.8	31 0.2	31 1.4	31 2.0
8	29.82	55	„ „ 55	30 55.5	31 0.2	30 58.5
9	29.73	53	„ „ 49.7	30 49.7	30 55.0	30 55.0
10	29.85	47.5	„ „ 58.0	31 6.6	30 57.0	31 0.0
11	29.88	49.7	„ „ 48.3	30 58.0	30 56.5	30 54.5
27	29.78	49	„ „ 51.5	30 57.0	30 56.1	30 52.4
May 1	30.27	48	„ „ 52.7	30 57.5	30 57.0	30 54.0
Apr. 15	... Mean ...		340 30 53.0	30 57.8	30 57.6	30 56.6
Refract. + Reduct.			−4 16.9	4 16.9	4 16.9	4 16.9
			340 26 36.1	26 40.9	26 40.7	26 39.7

Mean S. P. D. of γ Piscis Volantis, Jan. 1, 1828 . . . . . 19° 46′ 53″.6 by 21 Obs.

∂ Hydri. (Ann. Var. + 16″.458.)

Superior Culmination.

1828.	Barom.	Therm.	Microscopes. I.	II.	III.	IV.
	inches.	°	° ′ ″	′ ″	′ ″	′ ″
July 12	29.93	37	20 47 49.2	47 54.7	47 55.3	47 56.3
13	29.91	31	„ „ 53	„ 58.0	48 1.0	„ 56.0
14	30.01	39.5	„ „ 50.7	„ 54.0	47 58.7	„ 51.0
18	30.02	36.5	„ „ 52.0	„ 56.5	47 57.2	„ 55.0
July 14.2	...Mean...		20 47 51.2	47 55.8	47 58.0	47 54.6
Refract. — Reduct.			−1 8.3	1 8.4	1 8.3	1 8.4
Superior Culminat.			20 46 42.9	46 47.4	46 49.7	46 46.2
Inferior Culminat...			339 39 57.6	39 59.5	39 59.5	40 5.6
Half Diff. S. P. D.			20 33 22.6	33 23.9	33 25.1	33 20.3

Inferior Culmination.

1828.	Barom.	Therm.	Microscopes. I.	II.	III.	IV.
	inches.	°	° ′ ″	′ ″	′ ″	′ ″
July 15	30.00	51.5	339 43 31.0	43 32.1	43 33.1	43 40
16	29.83	57.0	„ „ 29.0	„ 32.0	„ 32.0	„ 36
17	29.65	63.0	„ „ 28.3	„ 30.0	„ 30.0	„ 36.5
July 16....	Mean ...		339 43 29.5	43 31.4	43 31.4	43 37.5
Refract. and Reduct.			−3 31.9	3 31.9	3 31.9	3 31.9
			339 39 57.6	39 59.5	39 59.5	40 05.6

Mean of 4 Microscopes .....20° 33′ 23″.0 by 7 Observ.

1828.	Barom.	Therm.	Microscopes. I.	II.	III.	IV.
	inches.	°	° ′ ″	′ ″	′ ″	′ ″
July 20	29.60	50	20 48 2.2	48 0.0	48 5	48 5
22	29.81	45.5	„ „ 14.0	„ 17.0	„ 19.4	„ 15
24	30.03	35.5	„ „ 17.0	„ 19.0	„ 21.0	„ 17.0
25	30.14	35	„ „ 16	„ 20.4	„ 22.8	„ 18.7
26	30.29	35.5	„ „ 15.0	„ 19	„ 21.0	„ 20.0
27	30.23	32	„ „ 14.3	„ 19.0	„ 22.5	„ 19
30	30.22	27.2	„ „ 18.5	„ 21.4	„ 26.0	„ 22
Aug. 1	30.24	37	„ „ 15.0	„ 21.0	„ 22.5	„ 20.7
2	30.18	37	„ „ 19.0			
3	30.22	37	„ „ 17.3	„ 21	„ 26.7	„ 19.2
4	30.17	32	„ „ 18.0	„ 19	„ 23.3	„ 15.0
7	30.14	32	„ „ 11.0	„ 19.1	„ 15.5	„ 15.5
July 29....	Mean ...		20 48 14.8	48 17.8	48 20.5	48 17.0
Refract. and Reduct.			−1 10.0	1 10.0	1 10.0	1 10.0
Superior Culminat.			20 47 4.76	47 7.8	47 10.5	47 7.0
Inferior Culminat....			339 40 21.1	40 22.8	40 23.2	40 27.3
Half Diff. S. P. D.			20 33 21.8	33 22.5	33 28.6	33 19.9

1828.	Barom.	Therm.	Microscopes. I.	II.	III.	IV.
	inches.	°	° ′ ″	′ ″	′ ″	′ ″
July 21	29.59	49	339 43 46.7	43 50	43 54	43 55
23	30.00	57	„ 43 53	43 53	43 58	44 1
24	30.07	50.5	„ 43 56.5	43 59.5	44 0.4	44 6
26	30.20	52.2	„ 43 57.0	43 57.0	43 56.5	43 59.5
29	30.00	53	„ 43 50.3	43 57.4	43 53.7	
30	30.12	54	„ 44 0.5	44 1.4	44 1.0	44 3.5
Aug. 1	30.20	50	„ 43 57.5	43 59	43 56.2	44 1.7
2	30.18	52	„ 43 54.7	43 54.7	43 56.2	44 0.0
3	30.18	53.5	„ 43 58.7	43 59.2	43 58.0	44 4.0
July 28....	Mean ...		339 43 55.0	43 56.8	43 57.1	44 1.3
Refract. and Reduct.			−3 33.9	3 34.0	3 33.9	3 34.0
			339 40 21.1	40 22.8	40 23.2	40 27.3

Mean of 4 Microscopes.....20° 33′ 23″.2 by 21 Observ.

Mean S. P. D. of ∂ Hydri, Jan. 1, 1828 . . . . . 20° 33′ 23″.16 by 28 Observ.

ω Argus. (Ann. Var. — 17″.735.)

Superior Culmination.

1827.	Barom.	Therm.	Microscopes. I.	II.	III.	IV.
	inches.	°	h m s	m s	m s	m s
June 1	30.30	58.5	21 4 11.5	4 22	4 24	4 25.6
13	30.02	58	„ „ 12.5	„ 18	„ 25.8	„ 29.3
14	29.79	57	„ „ 14.5	„ 19.5	„ 27.0	„ 30.0
June 9... Mean ...			21 4 12.8	4 19.8	4 25.8	4 28.3
Refract. and Reduct.			−25.0	25.0	25.0	25.0
Superior Culminat.			21 3 47.8	3 54.8	4 0.8	4 3.3
Inferior Culminat...			339 26 1.6	26 5.8	26 19.6	26 20.2
Half Diff. S. P. D.			20 48 53.1	48 54.5	48 50.6	48 51.6

Inferior Culmination.

1827.	Barom.	Therm.	Microscopes. I.	II.	III.	IV.
	inches.	°	h m s	m s	m s	m s
June 13	29.86	39	339 30 28	30 32.2	30 46.0	30 46.5
Refract. and Reduct.			−4 26.4	4 26.4	4 26.4	4 26.3
			339 26 1.6	26 5.8	26 19.6	26 20.2

Mean of 4 Microscopes .....20° 48′ 52″.45 by 4 Observ.

Mean S. P. D. of ω Argus, Jan. 1, 1828 . . . . . 20° 48′ 52″.45 by 4 Observ.

β Argus. (Ann. Var. — 14″.834.)

Superior Culmination.

1822.	Barom.	Therm.	Microscopes. I.	II.	III.	IV.
	inches.	°	h m s	m s	m s	m s
May 3	30.12	56	21 0 55.3	1 56	0 54.5	0 48.7
7	29.97	64.3	„ 1 1.9	„ 53	„ 59.2	„ 45.6
9	29.86	60.5	„ 0 55	„ 8	„ 56	„ 48
May 6... Mean ...			21 0 57.4	.....	0 56.6	0 47.4
Refract. and Reduct.			−1 45.6	.....	1 45.6	1 45.6
Superior Culminat.			20 59 12.8	.....	59 11.0	59 1.8
Inferior Culminat...			339 0 14.8	.....	0 20.6	0 13.8
Half Diff. S. P. D.			20 59 29.0	59 26.3	59 25.2	59 24.0

Inferior Culmination.

1822.	Barom.	Therm.	Microscopes. I.	II.	III.	IV.
	inches.	°	h m s	m s	m s	m s
May 2	30.09	49	339 3 23	4 25.3	3 30.9	3 24.2
9	29.89	53	„ „ 13.5	3 36	„ 27.7	„ 15.0
10	30.05	41	„ „ 33.7	3 46	„ 29.0	„ 25.0
May 7... Mean ...			339 3 23.4	.....	3 29.2	3 21.4
Refract. and Reduct.			−3 8.6	.....	3 8.6	3 8.6
			339 0 14.8	.....	0 20.6	0 13.8

Mean of 4 Microscopes.....20° 59′ 26″.12 by 6 Observ.

Superior Culmination.

1822.	Barom.	Therm.	Microscopes. I.	II.	III.	IV.
	inches.	°	h m s	m s	m s	m s
May 21	29.96	59	21 0 56	0 25	1 4.5	0 56.7
22	29.96	62	„ 0 58	„ 19.2	„ 2.7	1 5.0
23	29.77	66	„ 0 52.3	„ 22.8	„ 8.7	1 1.0
26	29.62	61	„ 0 52.0	„ 34.0	„ 6.8	1 3.0
27	29.87	62	„ 0 59.0	„ 32.7	„ 8.7	1 3.0
28	30.00	55	„ 0 56.0	„ 26.0	„ 12.0	1 1.0
30	29.78	62	„ 1 2.0	„ 25.0	„ 13.0	1 10.2
June 1	29.58	62	„ 0 56.0	„ 44.2	„ 6.5	0 59.2
2	29.85	57.5	„ 0 59.0	.....	„ 11.8	0 9.7
6	29.95	57	„ 1 1.7	„ 44	„ 13.0	0 3.7
8	30.10	56.2	„ 1 2.8	„ 47.2	„ 15.2	0 7.0
10	29.80	57.5	„ 1 1.3	„ 50.5	„ 14.8	0 2.0
*29	29.99	59.0	„ 1 16.7	„ 58.8	„ 29.5	0 18.5
June 2... Mean ...			21 0 59.45	0 38.4	1 11.3	1 4.6
Refract. and Reduct.			−1 46.5	1 46.5	1 46.5	1 46.5
Superior Culminat.			20 59 12.9	58 51.9	59 24.8	59 18.1
Inferior Culminat...			339 0 19.6	59 59.7	0 36.6	0 24.1
Half Diff. S. P. D.			40 59 26.65	59 26.1	59 24.1	59 27.0

Inferior Culmination.

1822.	Barom.	Therm.	Microscopes. I.	II.	III.	IV.
	inches.	°	h m s	m s	m s	m s
May 21	29.95	53.3	339 3 26.3	3 2.6	3 45	3 20.3
30	29.63	50.3	„ „ 14.6	2 45.0	„ 36	„ 22.0
June 3	29.71	48	„ „ 26	3 19.5	„ 36.5	„ 38.0
May 28... Mean ...			339 3 22.3	3 2.4	3 39.3	3 26.8
Refract. and Reduct.			−3 2.7	3 2.7	3 2.7	3 2.7
			339 0 19.6	59 59.7	0 36.6	0 24.1

Mean of 4 Microscopes.....40° 59′ 25″.96 by 16 Observ.

β Argus. (Ann. Var. — 14.″834.)—(Continued.)

Superior Culmination.

1822.	Barom.	Therm.	Microscopes. I.	II.	III.	IV.
	inches.	°	° ′ ″	′ ″	′ ″	′ ″
Aug. 31	29.89	60	58 57 18	.....	57 20.8	57 26.7
Sept. 2	29.80	64	„ „ 19.2	56 45	„ 22	„ 26.0
4	29.56	66	„ „ 20.5	„ 41.8	„ 18.4	„ 19.5
11	30.027	60.5	„ „ 31.0	„ 51.7	„ 30.3	„ 32.0
13	29.38	61.5	„ „ 29.0	„ 54.5	„ 27.5	„ 26.3
15	29.87	54.8	„ „ 31.8	„ 57.2	„ 31.3	„ 33.0
16	29.92	57.0	„ „ 34.0	„ 52.1	„ 32.2	„ 29
17	29.84	59.7	„ „ 27.0	„ 53.8	„ 32.2	„ 28.3
18	29.56	70.5	„ „ 29.5	„ 59.4	„ 29.3	„ 23.5
21	29.57	63.7	„ „ 23.7	„ 32	„ 24	„ 26
22	29.59	63	„ „ 25.8	„ 42.8	„ 25.3	„ 25.8
23	29.82	67	„ „ 21.7	„ 40.7	„ 28.4	„ 21.1
24	29.91	62	„ „ 28	„ 40.5	„ 27.9	„ 26.0
25	29.77	61.5	„ „ 25.6	„ 47.1	„ 32.8	„ 24.1
28	29.61	83.7	„ „ 33.0	„ 51.6	„ 32.2	„ 27
29	29.57	63	„ „ 24.6	„ 48.5	„ 34.4	„ 30.7
Oct. 1	29.60	66.2	„ „ 29.0	„ 48.5	„ 34	„ 30
2	29.70	62.5	„ „ 28.7	„ 47.5	„ 33	„ 31
3	29.88	62.5	„ „ 29.5	„ 45	„ 35	„ 30.3
6	30.01	63	„ „ 29.5	„ 50	„ 35	„ 29.0
Sept. 20	... Mean ...		58 57 26.9	56 47.5	57 29.3	57 27.2
Refract. and Reduct.			−2 12.1	2 12.1	2 12.1	2 12.1
Superior Culminat.			58 55 14.8	54 35.4	55 17.2	55 15.1
Inferior Culminat...			16 56 22.5	55 42.3	56 40.1	56 17.3
Half Diff. S. P. D.			20 59 26.15	59 26.55	59 18.5	59 28.9

Inferior Culmination.

1822.	Barom.	Therm.	Microscopes. I.	II.	III.	IV.
	inches.	°	° ′ ″	′ ″	′ ″	′ ″
Sept. 15	29.84	49	16 58 56.8	58 25	59 19.6	58 54.2
16	29.88	43	„ 59 6.7	„ 25	„ 21	„ 58.8
17	29.89	47.5	„ 59 10.0	„ 32	„ 24.5	„ 58.5
18	29.63	61.5	„ 58 56	„ 14.5	„ 6.4	„ 47.3
19	29.77	58	„ 58 56.7	„ 17.0	„ 8	„ 56
21	29.39	55.8	„ 58 45.5	„ 1.7	„ 7.2	„ 45.2
23	29.72	60.8	„ 58 45.1	„ 4.0	„ 6.3	„ 44.7
24	29.92	50	„ 59 3.3	„ 17.8	„ 18.1	„ 52.2
26	29.82	55.8	„ 58 48.0	„ 7.4	„ 12.2	„ 45.4
30	29.56	58	„ 58 46.7	„ 9.5	„ 8.0	„ 41.0
Sept. 21	... Mean ...		16 58 55.5	58 15.4	59 13.13	58 50.4
Refract. and Reduct.			−2 33.0	2 33.1	2 33.0	2 33.1
			16 56 22.5	55 42.3	56 40.1	56 17.3

Mean of 4 Mieroscopes.....20° 59′ 25″.04 by 30 Observ.

Superior Culmination.

1823.	Barom.	Therm.	Microscopes. I.	II.	III.	IV.
	inches.	°	° ′ ″	′ ″	′ ″	′ ″
Apr. 12	30.14	67.8	58 56 24.4	57 22.8	57 11.0	56 44.2
13	29.97	66	„ „ 26.3	„ 20.0	„ 7.0	„ 47.7
14	29.96	63.5	„ „ 22.3	„ 21.4	„ 4.4	„ 38
15	29.90	65	„ „ 27.4	„ 21.7	„ 4.5	„ 45
16	30.00	64.3	„ „ 27.3	„ 22.0	„ 6.5	„ 39.6
17	29.81	64.3	„ „ 25.5	„ 21.7	„ 7.0	„ 46.9
23	30.05	62.2	„ „ 26.3	„ 24.9	„ 6.0	„ 44.2
26	30.00	63.7	„ „ 24.3	„ 24.2	„ 5.1	„ 44.2
Apr. 15	... Mean ...		58 56 25.7	57 22.8	57 6.7	56 43.7
Refract. and Reduct.			−1 29.7	1 29.7	1 29.7	1 29.7
Superior Culminat.			58 54 56.0	55 53.1	55 37.0	55 14.0
Inferior Culminat...			16 56 13.8	57 2.5	56 49.9	56 25.1
Half Diff. S. P.D.			20 59 21.1	59 25.3	59 23.5	59 24.5

Inferior Culmination.

1823.	Barom.	Therm.	Microscopes. I.	II.	III.	IV.
	inches.	°	° ′ ″	′ ″	′ ″	′ ″
Apr. 19	30.90	54	16 59 39	0 28.7	0 14.3	59 50
24	30.02	59.3	„ „ 34.7	„ 21.7	„ 11.0	„ 47.5
25	30.07	56.7	„ „ 31.9	„ 21.5	„ 8.7	„ 42.3
Apr. 23	... Mean ...		16 59 35.2	0 24	0 11.3	59 46.6
Refract. and Reduct.			−3 21.4	3 21.5	3 21.4	3 21.5
			16 56 13.8	57 2.5	56 49.9	56 25.1

Mean of 4 Microscopes ..... 20° 59′ 23″.8 by 11 Observ.

β Argus. (Ann. Var. — 14″.834.)—(Continued.)

Superior Culmination.

1823.	Barom.	Therm.	Microscopes. I.	II.	III.	IV.
	inches.	°	° ′ ″	° ′ ″	° ′ ″	° ′ ″
May 2	30.14	55.5	58 56 26.8	57 23.8	57 3.8	56 40.8
5	30.16	64.3	„ „ 27.0	„ 25.8	„ 9.5	„ 42.3
6	30.14	65	„ „ 22.4	„ 22.0	„ 6.8	„ 40.0
8	30.36	60	„ „ 26.4	„ 27.7	„ 13.2	„ 47.4
9	30.27	66	„ „ 34.7	„ 27.0	„ 13.2	„ 45
10	30.15	65	„ „ 26.0	„ 26.2	„ 7.5	„ 46
11	29.96	62.5	„ „ 24.0	„ 28.3	„ 6.2	„ 43
24	29.70	50	„ „ 29.5	„ 36.5	„ 13.8	„ 46
May 9	4...Mean...		58 56 27.1	57 27.2	57 9.4	56 43.8
Refract. and Reduct.			−1 26.8	1 26.9	1 26.8	1 26.9
Superior Culminat.			58 55 0.3	56 0.3	55 42.6	55 16.9
Inferior Culminat...			16 56 10.6	57 9.7	56 58.3	56 25.2
Half. Diff. S. P. D.			20 59 24.8	59 25.3	59 22.2	59 25.8

Inferior Culmination.

1823.	Barom.	Therm.	Microscopes. I.	II.	III.	IV.
	inches.	°	° ′ ″	° ′ ″	° ′ ″	° ′ ″
May 4	30.15	52	16 59 32.5	0 30.5	0 20.0	59 47.5
8	30.36	53	16 59 35.0	0 34.0	0 22.8	59 49.0
May 6... Mean ...			16 59 33.7	0 32.7	0 21.4	59 48.2
Refract. and Reduct.			−3 23.1	3 23.0	3 23.1	3 23.0
			16 56 10.6	57 9.7	56 58.3	56 25.2

Mean of 4 Microscopes.....90° 59′ 24″.54 by 10 Observ.

Superior Culmination.

1826.	Barom.	Therm.	Microscopes. I.	II.	III.	IV.
	inches.	°	° ′ ″	° ′ ″	° ′ ″	° ′ ″
May 25	30.09	57	21 40 47.3	40 43	40 46	40 47.6
28	30.25	57	„ „ 34.5	„ 44	„ 42	„ 50
June 3	29.93	64	„ „ 51.0	„ 46.7	„ 45.7	„ 51
5	29.96	56	„ „ 54.0	„ 48.7	„ 47.8	„ 54.7
6	29.85	55	„ „ 50.5	„ 45.7	„ 50.0	„ 55.7
7	29.73	59.5	„ „ 60.0	„ 59.0	„ 55.5	„ 65.5
8	29.88	55	„ „ 57.0	„ 51.5	„ 49.5	„ 54.0
9	29.93	56	„ „ 49.3	„ 48.1	„ 45.9	„ 48.1
11	30.08	52	„ „ 55.0	„ 48	„ 47.2	„ 54.2
12	30.15	55	„ „ 56.6	„ 55	„ 54.2	„ 58.5
13	30.22	55	„ „ 52.0	„ 48	„ 52.7	„ 60.0
14	30.19	55	„ „ 63.0	„ 52	„ 48.9	„ 58
16	29.91	62	„ „ 58.7	„ 49	„ 48.0	„ 56.5
17	29.84	59	„ „ 57.0	„ 53.2	„ 47.0	„ 57.1
19	29.97	57	„ „ 56.3	„ 51.0	„ 47.7	„ 57.0
20	30.03	57	„ „ 52.1	„ 46.5	„ 45.3	„ 53.5
June 9	... Mean ...		21 40 53.4	40 49.3	40 48.4	40 55.0
Refract. and Reduct.			−38.9	38.9	38.9	39.0
Superior Culminat.			21 40 14.5	40 10.4	40 9.5	40 16.0
Inferior Culminat...			339 41 18.4	41 21.2	41 21.6	41 25.2
Half Diff. S. P. D.			20 59 28.05	59 24.6	59 23.95	59 25.4

Inferior Culmination.

1826.	Barom.	Therm.	Microscopes. I.	II.	III.	IV.
	inches.	°	° ′ ″	° ′ ″	° ′ ″	° ′ ″
May 20	30.08	34.5	339 45 54.2	45 59.2	45 40	45 43.2
June 1	29.94	51.5	„ „ 28.0	„ 31.2	„ 28.6	„ 32.8
2	29.89	43	„ „ 30.3	„ 30.0	„ 27.3	„ 33.7
4	30.00	37	„ „ 40.5	„ 46.2	„ 43.6	„ 45.2
5	29.93	36.7	„ „ 38.0	„ 39.0	„ 40.3	„ 45.8
7	29.87	42.5	„ „ 32	„ 29.0	„ 32	„ 39.2
9	29.97	37	„ „ 41.0	„ 46	„ 42	„ 46
13	30.20	32	„ „ 36.1	„ 46.6	„ 51	„ 53.4
17	29.85	48	„ „ 29.5	„ 27.5	„ 33.2	„ 32.0
June 5	... Mean ...		339 45 34.4	45 37.2	45 37.6	45 41.3
Refract. and Reduct.			−4 16.0	4 16.0	4 16.0	4 16.1
			339 41 18.4	41 21.2	41 21.6	41 25.2

Mean of 4 Microscopes.....90° 59′ 25″.5 by 25 Observ.

β Argus. (Ann. Var. — 14″.834.)—(Continued.)

Superior Culmination.

1826.	Barom.	Therm.	Microscopes. I.	II.	III.	IV.
	inches.	°	° ′ ″	′ ″	′ ″	′ ″
June 27	30.163	54	21 40 54.5	40 55.3	40 49.3	40 58
July 6	30.05	49.5	„ 40 55.0	40 47.0	.....	40 49.5
14	30.17	56	„ 41 7.0	40 58	40 55.0	41 6.1
15	30.13	42	„ 41 4.5	40 58	40 55	41 4.7
30	30.40	54.5	„ 41 11.1	41 2.5	41 2.3	41 10.1
31	30.38	56	„ 41 12.7	41 1.0	41 2.7	41 8.3
Aug. 4	30.00	51	„ 41 8.7	40 56.3	40 52	41 3.1
July 18	... Mean ...		21 41 4.8	40 56.9	40 56.1	41 2.8
Refract. and Reduct.			−48.2	48.3	48.2	48.3
Superior Culminat.			21 40 16.6	40 08.6	40 07.9	40 14.5
Inferior Culminat...			339 41 21.7	41 23.7	41 20.8	41 28.8
Half Diff. S. P. D.			20 59 27.4	59 22.4	59 23.5	59 22.9

Inferior Culmination.

1826.	Barom.	Therm.	Microscopes. I.	II.	III.	IV.
	inches.	°	° ′ ″	′ ″	′ ″	′ ″
June 30	30.14	35.8	339 45 40.7	45 38.7	45 37.7	45 46.4
July 8	30.90	34.7	339 45 32.7	45 39.0	45 34.0	45 41.5
July 4	... Mean ...		339 45 36.7	45 38.8	45 35.8	45 43.9
Refract. and Reduct.			−4 15.0	4 15.1	4 15.0	4 15.1
			339 41 21.7	41 23.7	41 20.8	41 28.8

Mean of 4 Microscopes.....20° 59′ 24″.05 by 9 Observ.

Superior Culmination.

1826.	Barom.	Therm.	Microscopes. I.	II.	III.	IV.
	inches.	°	° ′ ″	′ ″	′ ″	′ ″
Sept. 23	30.20	57.7	21 41 14	41 5.3	41 8.1	41 13.3
Oct. 1	30.12	66	„ „ 9	40 58	41 2.0	„ 8.3
4	30.00	60	„ „ 15.7	41 0.5	41 7.0	„ 11.6
9	30.03	59.8	„ „ 8.0	40 53	41 0.7	„ 7.3
11	29.97	64	„ „ 12.4	41 0.0	41 3.5	„ 11.0
15	29.98	67	„ „ 10.0	40 57	41 2.0	„ 7.5
17	29.87	61	„ „ 8.5	40 56	41 1.4	„ 6.2
30	30.07	53	„ „ 7.0	40 59	41 0.0	„ 3.6
Nov. 6	30.02	63	„ „ 15.0	40 56	40 58.3	„ 7.4
9	30.03	50.5	„ „ 12.0	40 55.0	41 0.5	„ 8.3
13	30.01	55.5	„ „ 8.0	40 50	40 58	„ 2.3
Oct. 18	... Mean ...		21 41 10.9	40 58.2	41 2.0	41 7.9
Refract. and Reduct.			−1 10.1	1 10.1	1 10.1	1 10.1
Superior Culminat.			21 40 0.8	39 48.1	39 51.9	39 57.8
Inferior Culminat...			339 41 9.9	41 3.9	41 7.3	41 12.0
Half Diff. S. P. D.			20 59 25.4	59 22.1	59 22.3	59 22.9

Inferior Culmination.

1826.	Barom.	Therm.	Microscopes. I.	II.	III.	IV.
	inches.	°	° ′ ″	′ ″	′ ″	′ ″
Sept. 21	30.075	47.3	339 45 0.0	45 1.0	45 0.0	45 3.7
23	30.11	53	„ 44 55.5	44 55.0	44 53.3	44 58.7
Oct. 4	29.87	62	„ 44 44.0	44 35.0	44 45	44 49.0
9	29.89	60	„ 44 51	44 43	44 42.7	44 50.0
13	29.71	70	„ 44 35	44 32.7	44 31.3	44 31.4
14	29.75	69.3	„ 44 41.0	44 25.0	44 33.3	44 44.0
15	29.70	72	„ 44 32	44 26	44 33	44 35
30	30.05	57	„ 44 38	44 31	44 37.5	44 42
Oct. 8	... Mean ...		339 44 44.6	44 38.6	44 42.0	44 46.7
Refract. and Reduct.			−3 34.7	3 34.7	3 34.7	3 34.7
			339 41 09.9	41 03.9	41 07.3	41 12.0

Mean of 4 Microscopes.....20° 59′ 22″.94 by 19 Observ.

β Argus. (Ann. Var. — 14″.834.)—(Continued.)

Superior Culmination.

1827.	Barom.	Therm.	Microscopes. I.	II.	III.	IV.
	inches.	°	h m s	h m s	h m s	h m s
Apr. 29	30.08	56.5	21 14 41.0	14 52	14 47	14 51.7
30	29.94	60	„ „ 41.3	„ 44	„ 45	„ 30.0
May 1	29.88	61.5	„ „ 42.4	„ 42.4	„ 41.3	„ 32.5
2	29.80	61	„ „ 41.0	„ 41.7	„ 42.0	„ 31.5
3	29.85	60	„ „ 38	„ 42.0	„ 46	„ 30.0
4	29.91	53.3	„ „ 40.6	„ 51.7	„ 49.6	„ 31.6
5	29.93	57.0	„ „ 45.0	„ 48.0	„ 49.0	„ 35
6	30.07	67.5	„ „ 40	„ 53	„ 48.4	„ 34
7	30.07	68	„ „ 41.4	„ 49	„ 47.7	„ 34
9	30.10	62.5	„ „ 37.5	„ 44.1	„ 48.4	„ 52.3
10	30.17	60.5	„ „ 42.9	„ 43.8	„ 52.5	„ 49.0
16	30.01	60	„ „ 33.3	„ 42.1	„ 44.7	„ 48
19	30.02	51	„ „ 40.0	„ 40.0	„ 50.0	„ 53.6
21	30.13	55.5	„ „ 45.0	„ 32.5	„ 50.5	„ 52.0
23	30.15	61	„ „ 42.7	„ 45.0	„ 51.9	„ 54.0
24	30.07	63	„ „ 46.0	„ 40.5	„ 51.2	„ 56.0
25	30.12	63	„ „ 42	„ 45.7	„ 49.3	„ 54.5
May 10	... Mean ...		21 14 41.1	14 44.7	14 49.1	14 42.9
Refract. and Reduct.			−21.8	21.8	21.8	21.8
Superior Culminat.			21 14 19.3	114 22.9	14 27.3	14 21.1
Inferior Culminat...			339 15 29.9	15 32.5	15 40.0	15 32.2
Half Diff. S. P. D.			20 59 24.7	59 25.2	59 23.6	59 24.4

Mean Inside Temperature 61°.4.

Inferior Culmination.

1827.	Barom.	Therm.	Microscopes. I.	II.	III.	IV.
	inches.	°	h m s	h m s	h m s	h m s
May 5	30.07	47.3	339 20 2.7	20 4.0	20 8.0	19 56.8
6	30.12	48	„ 20 1.0	20 2.0	„ 11.0	19 55.0
8	30.09	48.3	„ 19 50.7	19 59.5	„ 3.0	20 10.0
9	30.20	59	„ 19 58.2	20 0.3	„ 7.0	20 15.8
19	30.00	41.5	„ 19 58.6	19 58.6	„ 12.6	20 15.3
May 9,4... Mean...			339 19 58.2	20 0.9	20 8.3	20 0.6
Refract. and Reduct.			−4 28.3	4 28.4	4 28.3	4 28.4
			339 15 29.9	15 32.5	15 40.0	15 32.2

Mean of 4 Microscopes.....20° 59′ 24″.47 by 22 Observ.

Mean Inside Temperature 54°.

1827.	Barom.	Therm.	Microscopes. I.	II.	III.	IV.
	inches.	°	h m s	h m s	h m s	h m s
May 31	30.18	63	21 14 39	14 50	14 55.2	14 51.2
June 1	30.31	58.5	„ „ 42.5	„ 44.7	14 54.0	14 51.0
2	30.19	62	„ „ 42.7	„ 42.5	14 55.3	14 54.7
8	30.12	57	„ „ 45	„ 43.3	14 53.7	14 49.4
12	30.27	51	„ „ 48.7	„ 53.2	14 59.6	14 57.0
13	30.02	58	„ „ 50.7	„ 48.3	14 56.3	15 1.0
14	29.79	57	„ „ 46.0	.....	14 56.5	14 57.0
25	30.07	60.5	„ „ 54.1	„ 54.3	15 0.0	14 55.0
26	30.03	53	„ „ 56.5	„ 52.3	14 58.7	14 57.0
29	29.93	44.7	„ „ 58.0	„ 55.0	15 0.5	14 59.5
June 13	... Mean ...		21 14 48.3	14 49.3	14 57.0	14 55.3
Refract. and Reduct.			−24.6	24.6	24.6	24.6
Superior Culminat.			21 14 23.7	14 24.7	14 32.4	14 30.7
Inferior Culminat...			339 15 33.6	15 32.8	15 43.6	15 48.3
Half Diff. S. P. D.			20 59 25.0	59 26.0	59 24.4	59 21.2

Inferior Culmination.

1827.	Barom.	Therm.	Microscopes. I.	II.	III.	IV.
	inches.	°	h m s	h m s	h m s	h m s
May 31	30.33	45	339 20 1.3	20 4.8	20 16.2	20 20.5
June 1	30.27	40.5	„ 20 1.0	20 7.4	„ 19.5	„ 19.0
7	30.09	47.0	„ 19 56.5	19 58.8	„ 9.2	„ 17.5
13	29.88	42	„ 20 4.3	20 6.2	„ 14.0	„ 19.2
July 9	30.27	48	„ 20 0.0	19 55.0	„ 6.4	„ 13.4
June 12	... Mean ...		339 20 3.1	20 2.4	20 13.1	20 17.9
Refract. and Reduct.			−4 29.5	4 29.6	4 29.5	4 29.6
			339 15 33.6	15 32.8	15 43.6	15 48.3

Mean of 4 Microscopes.....20° 59′ 24″.15 by 15 Observ.

β Argus. (Ann. Var. + 14″.834.)—(Continued.)

Superior Culmination.

1827.	Barom.	Therm.	Microscopes. I.	II.	III.	IV.
	inches.	°	° ′ ″	° ′ ″	° ′ ″	° ′ ″
Sept. 2	30.07	63.7	21 15 9.7	15 8.5	15 14.9	15 12.4
3	30.07	63	„ „ 10.0	„ 11.5	„ 14.5	„ 11.5
8	29.99	57	„ „ 14.0	„ 13	„ 22.7	„ 20.0
9	29.87	62.5	„ „ 13.5	„ 8.1	„ 14.7	„ 14.7
12	29.78	63.9	„ „ 13.3	„ 12.0	„ 15.6	„ 15.0
13	29.85	58.8	„ „ 11.8	„ 10.2	„ 11.4	„ 14.7
14	29.90	57.0	„ „ 12.0	„ 10.4	„ 16.7	„ 15.3
15	30.01	55	„ „ 12.0	„ 7.0	„ 15.8	„ 13.0
18	30.15	58.4	„ „ 13.8	„ 11.8	„ 19.5	„ 14.0
19	30.14	58	„ „ 15.0	„ 11.7	„ 17.3	„ 17.5
22	29.96	57	„ „ 15.5	„ 13.9	„ 17.4	„ 22
23	29.66	59	„ „ 18.0	„ 14.3	„ 19.5	„ 16.5
24	29.71	63	„ „ 13.4	„ 14.1	„ 20.1	„ 18.0
25	30.09	61.3	„ „ 15.4	„ 13.3	„ 18.6	„ 18.0
30	30.12	57	„ „ 16.5	„ 16.1	„ 21.0	„ 20
Oct. 1	30.13	57	„ „ 16.0	„ 13.4	„ 22.1	„ 20.7
2	30.20	50	„ „ 13.0	„ 15.3	„ 23.2	„ 17.0
6	30.02	58	„ „ 19.0	„ 19.0	„ 21.5	„ 23.5
19	30.15	59.5	„ „ 15.7	„ 15.0	„ 21.0	„ 21.2
20	30.00	60	„ „ 14.0	„ 14.0	„ 15	„ 19
29	29.91	66.5	„ „ 8.8	„ 5.3	„ 12	„ 16
31	29.93	63.5	„ „ 13.3	„ 13.0	„ 15	„ 19
Nov. 11	29.80	58.3	„ „ 8.2	„ 8.7	„ 11.0	„ 12.7
14	29.95	51	„ „ 9.2	„ 5.8	„ 10.0	„ 11.5
Sept. 29	... Mean ...		21 15 13.4	15 12.0	15 17.1	15 16.8
Refract. and Reduct.			—50.7	50.7	50.7	50.7
Superior Culminat.			21 14 22.7	14 21.3	14 26.4	14 26.1
Inferior Culminat...			339 15 24.0	15 27.1	15 33.2	15 38.6
Half. Diff. S. P. D.			20 59 29.3	59 27.1	59 26.6	59 23.8

Inferior Culmination.

1827.	Barom.	Therm.	Microscopes. I.	II.	III.	IV.
	inches.	°	° ′ ″	° ′ ″	° ′ ″	° ′ ″
Aug. 28	29.55	50.5	339 19 20.5	19 13.5	19 26.2	19 35
Sept. 2	30.10	46.7	„ 19 35.5	19 37.0	„ 43.0	„ 52
11	29.66	64.6	„ 19 14.5	19 23	„ 25.5	„ 33
14	29.90	48	„ 19 27.5	19 32.8	„ 41.0	„ 42.3
15	29.95	49.3	„ 19 24.7	19 29.3	„ 35.5	„ 42.6
16	29.93	45	„ 19 30.8	19 33.7	„ 37.3	„ 43.8
19	30.14	47.7	„ 19 29.0	19 32	„ 40.0	„ 41.1
20	29.98	53.5	„ 19 22.8	19 32.8	„ 31.2	„ 36.0
21	29.63	64	„ 19 14.0	19 17.7	„ 20.0	„ 29.1
22	29.95	49	„ 19 28.0	19 32.7	„ 38	„ 39.5
23	29.67	56	„ 19 19.5	19 25.0	„ 29.3	„ 33.2
24	29.63	54.3	„ 19 22.0	19 26.5	„ 30.1	„ 34.0
27	29.92	60	„ 19 19.0	19 14.0	„ 22.0	„ 33.7
29	29.97	63	„ 19 21.0	19 26.0	„ 29	„ 34.0
30	30.11	57	„ 19 17.0	19 28	„ 34.2	„ 35.5
Oct. 1	30.00	61.3	„ 19 18.0	19 23.5	„ 28	„ 32
2	30.15	47.5	„ 19 25.0	19 27	„ 33.2	„ 37
7	29.92	55	„ 19 20.0	19 24.4	„ 31.1	„ 33.2
19	30.17	63.5	„ 19 10.0	19 9.4	„ 16.3	„ 22
29	29.93	73	„ 18 55.0	18 56.3	„ 2.8	„ 12.5
30	29.81	81	„ 18 52.1	18 51.4	„ 3.8	„ 11.0
Sept. 26	... Mean ...		339 19 19.2	19 22.4	19 28.4	19 33.9
Refract. and Reduct.			—3 55.2	3 55.3	3 55.2	3 55.3
			339 15 24.0	15 27.1	15 33.2	15 38.6

Mean of 4 Microscopes .....20° 59′ 26″.7 by 45 Observ.

β Argus. (Ann. Var. — 14″.834.)—(Continued.)

Superior Culmination.

1828.	Barom.	Therm.	Microscopes. I.	II.	III.	IV.
	inches.	°	′ ″	′ ″	′ ″	′ ″
Apr. 14	30.20	60.2	21 12 55	13 1.2	13 5	12 58
16	30.17	57.7	„ 12 57	13 5.3	13 10.2	13 3.7
17	30.07	56.0	„ 12 56.5	13 4.2	13 9.0	13 3.0
18	30.06	55	„ 13 0.0	13 6.2	13 14.3	13 6.2
20	29.85	60	„ 13 0.2	13 6.1	13 9.0	13 7.0
21	29.81	61	„ 12 57	13 4.5	13 5.3	13 5.2
22	29.90	57.5	„ 12 56	13 5.3	13 10.7	13 8.0
24	29.82	57.0	„ 12 55	13 4.2	13 6.8	13 5.8
25	30.01	57	„ 12 55.6	13 6.0	13 8.3	13 3.6
26	29.93	61	„ 12 56.3	13 2.2	13 5.5	13 2.0
27	29.82	61	„ 13 1.5	13 4.0	13 10.4	13 3.2
30	30.06	59.2	„ 13 0.0	13 1.8	13 9.0	13 0.5
May 1	30.25	58	„ 12 55.0	12 59.0	13 6.0	12 59.0
2	30.28	59	„ 12 52	13 3.7	13 5.0	12 59.6
8	29.71	56.5	„ 12 59.3	13 7.3	13 8.0	13 2.3
9	29.68	57.0	„ 12 58.0	13 4.2	13 5.8	13 1.0
11	29.78	69.2	„ 12 51.6	12 56.7	13 3.0	12 58
12	29.74	69.2	„ 12 54	13 1.0	13 6.7	12 58.3
13	29.79	66	„ 12 43	12 53.8	12 51.0	12 53
14	29.84	69	„ 12 44.8	12 53.0	12 58.7	12 53.5
Apr. 27... Mean ...			21 12 55.9	13 2.5	13 6.4	13 1.5
Refract. and Reduct.			−7.6	−7.6	−7.6	−7.6
Superior Culminat.			21 12 48.3	12 54.9	12 58.8	12 53.9
Inferior Culminat...			339 13 57.7	14 3.6	14 9.6	14 6.6
Half Diff. S. P. D.			20 59 25.3	59 25.6	59 24.6	59 23.6

Inferior Culmination.

1828.	Barom.	Therm.	Microscopes. I.	II.	III.	IV.
	inches.	°	′ ″	′ ″	′ ″	′ ″
Apr. 20	29.85	48.4	339 18 44.1	18 43	18 50.0	18 51.5
21	29.90	50.0	„ „ 41.2	„ 48	„ 50.5	„ 50.7
26	29.94	48	„ „ 46	„ 41	„ 51.0	„ 50.0
May 1	30.27	46	„ „ 43	„ 52	„ 55	„ 52
7	29.85	45.7	„ „ 46	„ 51	„ 58.5	„ 53
8	29.70	46.2	„ „ 39.5	„ 50	„ 53.5	„ 49.2
9	29.73	44.7	„ „ 39.2	„ 45	„ 52.3	„ 48.7
11	29.84	61.2	„ „ 24.3	„ 33.6	„ 41.0	„ 38
12	29.67	73.7	„ „ 26	„ 32.7	„ 39.2	„ 35
13	29.82	64.3	„ „ 17.5	„ 29.7	„ 35.5	„ 28
May 3. 8...Mean...			339 18 36.7	18 42.6	18 48.6	18 45.6
Refract. and Reduct.			−4 39.0	4 39.0	4 39.0	4 39.0
			339 13 57.7	14 3.6	14 9.6	14 6.6

Mean of 4 Microscopes.....20° 59′ 24″.8 by 30 Observ.

β Argus. (Ann. Var. — 14″.834.)—(Continued.)

Superior Culmination.

1828.	Barom.	Therm.	Microscopes. I.	II.	III.	IV.
	inces.	°	° ′ ″	° ′ ″	° ′ ″	° ′ ″
May 13	29.78	63.7	21 12 43	12 53.8	12 51	12 53
14	29.84	69	„ „ 44.8	12 53.0	12 58.7	„ 53.5
15	29.97	64	„ „ 39.2	12 46.8	12 54	„ 49
16	30.05	61.7	„ „ 40.8	12 53.5	12 58.5	„ 48.7
17	30.10	53	„ „ 46.0	12 54.2	13 0.8	„ 52
18	30.28	55	„ „ 42.7	12 52.3	12 54.3	„ 48
19	30.37	57.2	„ „ 44.7	12 52.3	12 52	„ 50.5
20	30.27	64	„ „ 42	12 51.0	12 50	„ 48
23	30.23	55.6	„ „ 43	12 49.4	12 54.3	„ 47.4
24	30.22	59.0	„ „ 46.7	12 48.5	12 54.5	„ 48.3
25	30.14	61.3	„ „ 44.8	12 49.3	12 56.1	„ 46.4
26	29.97	61.2	„ „ 45.0	12 51.4	12 56.0	„ 50.0
30	29.79	56	„ „ 42.7	12 48	12 53.4	„ 45.3
June 11	29.74	69.2	„ „ 54.0	13 1.0	13 6.7	„ 58.3
12	29.78	69.2	„ „ 51.6	12 56.7	13 3.0	„ 58.0
May 19	... Mean ...		21 12 44.7	12 52.1	12 56.2	12 50.5
Refract. and Reduct.			−7.3	7.3	7.3	7.2
Superior Culminat.			21 12 37.4	12 44.8	12 48.9	12 43.3
Inferior Culminat...			339 13 47.2	13 54.9	14 0.7	13 54.3
Half Diff. S. P. D.			20 59 25.1	59 24.9	59 24.1	59 24.5

Inferior Culmination.

1828.	Barom.	Therm.	Microscopes. I.	II.	III.	IV.
	inches.	°	° ′ ″	° ′ ″	° ′ ″	° ′ ″
May 13	29.82	64.3	339 18 17.5	18 29.7	18 35.5	18 28
14	29.92	49	„ „ 27.0	„ 37.0	„ 42.5	„ 38.7
15	30.04	38	„ „ 30.5	„ 41.2	„ 50.0	„ 47.0
16	30.07	34.5	„ „ 37.0	„ 49.2	„ 47.9	„ 40.0
17	30.18	36.3	„ „ 41.0	„ 47	„ 50.5	„ 46
18	30.36	37.3	„ „ 44.0	„ 49.3	„ 57.2	„ 50.1
29	29.80	35.5	„ „ 33.0	„ 35.7	„ 44.7	„ 35
May 17	4...Mean...		339 18 33.5	18 41.3	18 47.0	18 40.7
Refract. and Reduct.			−4 46.3	4 46.4	4 46.3	4 46.4
			339 13 47.2	13 54.9	14 0.7	13 54.3

Mean of 4 Microscopes.....20° 59′ 24″.65 by 22 Observ.

1828.	Barom.	Therm.	Microscopes. I.	II.	III.	IV.
	inches.	°	° ′ ″	° ′ ″	° ′ ″	° ′ ″
June 14	29.97	63	21 12 55.5	12 52.7	12 58.8	12 55.0
17	30.03	60	„ 12 57.0	12 46.2	12 48.3	12 51.0
20	30.27	55	„ 12 54.0	12 54.0	12 59.0	12 53.0
23	30.15	68	„ 12 49.0	12 46.0	12 48.3	12 50.0
July 1	29.76	62	„ 12 57.0	12 48.8	12 58	13 1.0
2	29.83	61	„ 13 3.2	12 54.7	12 57.5	13 0.0
4	29.82	53	„ 13 6.0	.....	13 4.5	12 59.0
5	30.13	58.5	„ 13 8	13 8	12 59.5	13 1.2
June 26	... Mean ...		21 12 58.7	12 52.9	12 49.2	12 56.3
Refract. and Reduct.			−11.4	11.4	11.4	11.3
Superior Culminat.			21 12 47.3	12 41.5	12 37.8	12 45.0
Inferior Culminat...			339 13 47.1	13 51.4	13 55.4	13 58.4
Half Diff. S. P. D.			21 59 30.1	59 25.0	59 21.2	59 23.3

Inferior Culmination.

1828.	Barom.	Therm.	Microscopes. I.	II.	III.	IV.
	inches.	°	° ′ ″	° ′ ″	° ′ ″	° ′ ″
June 17	30.112	38.5	339 18 32.4	18 35.4	18 43.3	18 46.6
19	30.34	36.5	„ „ 35.0	„ 40.0	„ 46.0	„ 44.7
20	30.26	36.5	„ „ 35.5	„ 41.0	„ 39.3	„ 44.1
July 3	29.722	44	„ „ 25.0	„ 29.0	„ 32.5	„ 38.0
June 22	... Mean ...		339 18 32.0	18 36.3	18 40.3	18 43.35
Refract. and Reduct.			−4 44.9	4 44.9	4 44.9	4 44.91
			339 13 47.1	13 51.4	13 55.4	13 58.4

Mean of 4 Microscopes ..... 21° 59′ 24″.9 by 12 Observ.

β Argus. (Ann. Var. + 14″.834.)—(Continued.)

Superior Culmination.

1828.	Barom.	Therm.	Microscopes. I.	II.	III.	IV.
	inches.	°	° ′ ″	″	″	″
Sept. 24	30.35	60	21 14 25	14 28.2	14 33	14 35.0
25	30.37	66.5	„ „ 32.7	„ 32.0	„ 31.3	„ 28.7
26	30.17	48	„ „ 31.0	„ 24.7	„ 22.4	„ 27.4
27	30.05	65.5	„ „ 28.0	„ 34.0	„ 26.7	„ 31.4
30	29.50	66	„ „ 38.0	„ 35.0	„ 35.7	„ 35.7
Sept. 26	4...Mean...		21 14 30.9	14 30.8	14 29.8	14 31.6
Refract. and Reduct.			−37.9	38.0	37.9	38.0
Superior Culminat.			21 13 53.0	13 52.8	13 51.9	13 53.6
Inferior Culminat...			339 14 54.7	14 57.8	14 58.3	15 2.4
Half Diff. S. P. D.			21 29 29.1	29 27.5	29 26.8	29 25.6

Inferior Culmination.

1828.	Barom.	Therm.	Microscopes. I.	II.	III.	IV.
	inches.	°	° ′ ″	″	″	″
Sept. 24	30.31	51.2	339 19 7.0	19 10.0	19 14.0	19 13.3
29	29.83	75	„ 18 54.6	18 56.0	18 53.5	19 4.0
31	30.10	60	„ 19 1.0	19 6.3	19 6.0	19 9.8
Sept. 28	... Mean ...		339 19 0.9	19 4.1	19 4.5	19 8.7
Refract. and Reduct.			−4 6.2	4 6.3	4 6.2	4 6.3
			339 14 54.7	14 57.8	14 58.3	15 2.4

Mean of 4 Microscopes.....21° 59′ 27″.25 by 8 Observ.

1828.	Barom.	Therm.	Microscopes. I.	II.	III.	IV.
	inches.	°	° ′ ″	″	″	″
Sept. 26	30.17	48	21 14 31	14 24.7	14 22.4	14 27.4
27	30.05	65.5	„ „ 28	„ 34.0	„ 26.7	„ 31.4
Oct. 2	30.18	57.0	„ „ 38	„ 33.0	„ 32	„ 35.0
4	29.90	63.5	„ „ 31.5	„ 32.5	„ 33.3	„ 33.3
6	30.16	56	„ „ 31.7	„ 32.5	„ 36.0	„ 37.6
7	30.15	57	„ „ 29.5	„ 33.3	„ 36.0	„ 37.0
18	30.00	60	„ „ 29.0	„ 34.7	„ 33.5	„ 32.0
19	29.92	66	„ „ 30.0	„ 33.0	„ 30	„ 31.5
23	30.13	64.5	„ „ 41.0	„ 32.6	„ 30.5	„ 39.0
24	30.05	61.0	„ „ 32.7	„ 37.8	„ 33.6	„ 34.0
25	29.87	62	„ „ 32.0	„ 33.5	„ 36.0	„ 35.5
26	29.73	72.7	„ „ 33	„ 36.0	„ 33.3	„ 35.0
27	29.85	63	„ „ 40.0	„ 37.0	„ 35	„ 36.4
28	29.85	66.3	„ „ 39.4	„ 42.7	„ 38.7	„ 37.5
Nov. 1	29.58	69	„ „ 29.0	„ 33.0	„ 32	„ 34
Oct. 16	... Mean ...		21 14 33.1	14 34.7	14 32.6	14 34.4
Refract. and Reduct.			−40.4	40.4	40.4	40.3
Superior Culminat.			21 13 52.7	13 54.3	13 52.2	13 54.1
Inferior Culminat...			339 14 52.8	14 58.3	14 59.8	15 2.8
Half Diff. S. P. D.			20 59 29.9	29 28.0	29 26.2	29 25.7

1828.	Barom.	Therm.	Microscopes. I.	II.	III.	IV.
	inches.	°	° ′ ″	″	″	″
Sept. 29	29.834	75	339 18 54.6	18 56	18 53.5	19 4
Oct. 2	30.70	60	„ 19 1.0	19 6.3	19 6.0	19 9.8
6	30.00	53	„ 19 4.8	19 11.0	19 12.0	19 14.0
7	29.95	61	„ 18 55.0	19 0.0	19 3.0	19 3.0
8	30.17	53.5	„ 19 6.0	19 9.0	19 15.3	19 15.0
9	29.66	65.2	„ 18 55	19 0.5	19 2.0	19 7.5
17	29.90	57.5	„ 18 57.0	19 7.0	19 4.0	19 5.1
18	29.98	58.0	„ 18 57.0	19 0.0	19 5.0	19 10.0
19	29.90	62	„ 18 50.0	18 57.5	18 59.5	18 56.0
22	29.92	58	„ 18 51.0	18 59.5	19 1.1	19 3.0
24	30.15	59.3	„ 18 57.0	19 3.0	19 4.0	19 5.6
25	29.83	69.3	„ 18 50.5	18 55	18 55.5	19 1.7
28	29.84	66	„ 18 56.0	19 2.4	19 0.0	19 5.0
29	29.83	81	„ 18 46.0	18 49.3	18 54.0	18 59.2
Nov. 1	29.56	75	„ 18 40.3	18 46.0	18 50.5	18 52.4
Oct. 16	3...Mean...		339 18 54.7	19 0.2	19 1.7	19 4.7
Refract. and Reduct.			−4 1.9	4 1.9	4 1.9	4 1.9
			339 14 52.8	14 58.3	14 59.8	15 2.8

Mean of 4 Microscopes.....21° 59′ 27″.45 by 30 Observ.

β Argus. (Ann. Var. —14″.834.)—(Continued.)

Superior Culmination.

1828.	Barom.	Therm.	Microscopes. I.	II.	III.	IV.
	inches.		° ′ ″	′ ″	′ ″	′ ″
Nov. 1	29.58	69	21 14 29	14 33	14 32	14 34
3	29.92	57	„ „ 26	„ 32.3	„ 38	„ 30.7
4	29.88	60	„ „ 30	„ 34.0	„ 35.3	„ 32.0
7	29.85	55	„ „ 23.7	„ 32	„ 35.3	„ 31.2
Nov. 4	... Mean ...		21 14 27.2	14 32.8	14 35.2	14 32.0
Refract. and Reduct.			—40.8	40.8	40.8	40.7
Superior Culminat.			21 13 46.4	13 52.0	13 54.4	13 51.3
Inferior Culminat...			339 14 53.6	15 0.8	15 2.7	15 3.5
Half Diff. S. P. D.			20 59 26.4	59 25.6	59 25.8	59 23.9

Inferior Culmination.

1828.	Barom.	Therm.	Microscopes. I.	II.	III.	IV.
	inches.		° ′ ″	′ ″	′ ″	′ ″
Nov. 2	29.59	66	339 18 50.7	18 57	18 56.8	19 0.3
3	29.77	59	339 18 56.0	19 4.0	19 8.0	19 6.0
Nov. 2.5	...Mean...		339 18 53.3	19 0.5	19 2.4	19 3.15
Refract. and Reduct.			—3 59.7	3 59.7	3 59.7	3 59.7
			339 14 53.6	15 0.8	15 2.7	15 3.5

Mean of 4 Microscopes.....21° 59′ 25″.42 by 6 Observ.

Superior Culmination.

1822.	Barom.	Therm.	Microscopes. I.	II.	III.	IV.
	inches.		° ′ ″	′ ″	′ ″	′ ″
Oct. 15	29.93	56.5	58 57 34	.....	57 39.7	57 32.7
16	29.92	55.5	„ „ 29.8	.....	„ 37.2	„ 32.2
18	29.73	68.7	„ „ 28.8	57 45.2	„ 29.5	„ 28.0
20	29.72	60.3	„ „ 27.5	57 35.6	„ 33.3	„ 23.0
21	30.01	60	„ „ 23.0	57 40.0	„ 36.3	„ 33.7
22	30.16	58.5	„ „ 34.8	57 39.7	„ 39.3	„ 31.8
27	29.88	63.5	„ „ 26.2	57 33.8	„ 35.6	„ 33.7
Nov. 3	29.99	64	„ „ 23.4	57 33	„ 33	„ 29.5
5	30.00	50.5	„ „ 23.2	58 3	„ 33.7	„ 28.7
6	29.66	63.7	„ „ 21.5	58 4.3	„ 31.4	„ 25.7
7	29.77	61	„ „ 22.6	58 3.7	„ 32	„ 28.8
8	29.99	56	„ „ 22.3	57 59.6	„ 33.7	„ 27.7
9	30.112	61	„ „ 21.4	57 52.0	„ 33.0	„ 30.7
16	30.03	63.7	„ „ 22	58 5.5	„ 36.5	„ 28.1
Oct. 28	... Mean ...		58 57 25.7	57 49.6	57 34.6	57 29.6
Refract. and Reduct.			—2 17.1	2 17.1	2 17.1	2 17.2
Superior Culminat.			58 55 8.6	55 32.5	55 17.5	55 12.4
Inferior Culminat...			16 56 24.0	56 56.3	56 39.6	56 19.0
Half Diff. S. P. D.			20 59 22.3	59 18.1	59 18.9	59 26.7

Inferior Culmination.

1822.	Barom.	Therm.	Microscopes. I.	II.	III.	IV.
	inches.		° ′ ″	′ ″	′ ″	′ ″
Oct. 15	29.89	53.8	16 58 52.4	.....	59 12	58 52.5
17	29.82	68	„ 58 50.0	.....	59 4	„ 40
22	30.10	56	„ 59 1.8	59 7.3	59 19	„ 50.4
Nov. 1	29.59	67	„ 58 38.0	58 39.5	58 52.5	„ 36.8
7	29.61	69.5	„ 58 40.6	59 15.7	58 51.3	„ 39.3
10	30.03	62	„ 58 51.6	59 23.2	59 0.1	„ 45.5
Nov. 27.5	...Mean...		16 58 49.1	59 21.4	59 4.7	58 44.1
Refract. and Reduct.			—2 25.1	2 25.1	2 25.1	2 25.1
			16 56 24.0	56 56.3	56 39.6	56 19.0

Mean of 4 Microscopes.....20° 59′ 21″.53 by 20 Observ.

Mean S. P. D. of β Argus, Jan. 1, 1828 . . . . . 20° 59′ 24″.93 by 350 Observ.

α Trianguli. (Ann. Var. — 7″.71.)

Superior Culmination.

1822.	Barom.	Therm.	Microscopes. I.	II.	III.	IV.
	inches.	°	° ′ ″	′ ″	′ ″	′ ″
Sept. 1	29.85	53.5	59 14 57.3	14 13	14 54.5	14 57.0
3	29.80	60	„ 14 59.0	„ 21	14 55.7	14 52.8
11	29.81	57	„ 15 7.5	„ 22	15 0.8	15 9
12	29.95	56.5	„ 15 5.0	„ 24.3	14 59.5	15 9.3
16	29.84	55.6	„ 15 3.2	„ 21.0	14 59.3	15 1.0
17	29.81	60.5	„ 15 4.3	„ 25.4	15 3.1	15 4.0
Sept. 10	... Mean ...		59 15 2.7	14 21.4	14 58.8	15 2.2
Refract. and Reduct.			−58.1	58.2	58.1	58.2
Superior Culminat.			59 14 4.6	13 23.2	14 0.7	14 4.0
Inferior Culminat...			16 37 40.8	37 2.6	37 46.3	37 37.8
Half Diff. S. P. D.			21 18 11.9	18 10.3	18 7.2	18 13.1

Inferior Culmination.

1822.	Barom.	Therm.	Microscopes. I.	II.	III.	IV.
	inches.	°	° ′ ″	′ ″	′ ″	′ ″
Aug. 21	29.82	49.5	16 41 37.3	.....	41 42	41 37
22	29.94	44	„ „ 41	.....	„ 45.2	„ 41
24	30.16	40	„ „ 44	.....	„ 47.0	„ 39.4
26	29.55	43	„ „ 39.7	.....	„ 42.0	„ 34.8
27	29.56	41	„ „ 38.8	.....	„ 44	„ 39
29	29.68	49.4	„ „ 35.5	.....	„ 39.3	„ 32.3
31	29.78	45	„ „ 39.0	.....	„ 44.7	„ 38.7
Sept. 1	29.86	39.8	„ „ 45.5	41 12	„ 53	„ 48
4	29.54	41.5	„ „ 36.0	40 53.2	„ 47.3	„ 39
5	29.52	44.5	„ „ 34.7	40 44.3	„ 38.3	„ 26
6	29.604	40	„ „ 41.0	41 4.0	„ 48.8	„ 35
11	29.93	39	„ „ 49.5	41 8.0	„ 54.3	„ 42.2
12	29.91	41.5	„ „ 48.3	41 14.0	„ 56.0	„ 47.0
Aug. 31	... Mean ...		16 41 40.8	41 2.6	41 46.3	41 37.9
Refract. and Reduct.			−4 0.0	4 0.0	4 0.0	4 0.1
			16 37 40.8	37 2.6	37 46.3	37 37.8

Mean of 4 Microscopes.....21° 18′ 10″.6 by 19 Observ.

1826.	Barom.	Therm.	Microscopes. I.	II.	III.	IV.
	inches.	°	° ′ ″	′ ″	′ ″	′ ″
Aug. 25	29.80	54	21 59 36.1	59 26	59 38.4	59 35
27	.....	54	„ „ 39.3	„ 30	„ 36.8	„ 32.6
31	29.93	54	„ „ 37.0	„ 27.3	„ 32.2	„ 31.2
Sept. 2	29.88	66	„ „ 36.5	„ 26.0	„ 31.7	„ 32.0
3	29.86	62	„ „ 38.2	„ 24.5	„ 34.0	„ 27.0
Aug. 30	... Mean ...		21 59 37.4	59 26.8	59 32.6	59 31.6
Refract. and Reduct.			−42.1	42.1	42.1	42.1
Superior Culminat.			21 58 55.3	58 44.7	58 50.5	58 49.5
Inferior Culminat...			339 22 36.7	22 34.6	22 35.9	22 44.4
Half Diff. S. P. D.			21 18 9.3	18 5.0	18 7.3	18 2.6

1826.	Barom.	Therm.	Microscopes. I.	II.	III.	IV.
	inches.	°	° ′ ″	′ ″	′ ″	′ ″
Aug. 18	29.75	42.5	339 26 54.0	26 54.5	26 54	27 3.3
19	29.77	43	„ „ 54	„ 49.2	„ 52	27 2.0
25	29.96	40.0	„ „ 51.8	„ 51.8	„ 55	27 2.0
Sept. 1	29.90	50	„ „ 47	„ 46.1	„ 45.2	26 55
2	29.88	45.5	„ „ 54	„ 53	„ 52.3	26 58.3
9	29.67	61.5	„ „ 39.0	„ 39	„ 36.3	26 45
Aug. 28	... Mean ...		339 26 49.9	26 47.8	26 49.1	26 57.6
Refract. and Reduct.			−4 13.2	4 13.2	4 13.2	4 13.2
			339 22 36.7	22 34.6	22 35.9	22 44.4

Mean of 4 Microscopes .....21° 18′ 6″.05 by 11 Observ.

α Trianguli. (Ann. Var. — 7″.71.)—(Continued.)

Superior Culmination.

1827.	Barom.	Therm.	Microscopes. I.	II.	III.	IV.
	inches.	°	° ′ ″	° ′ ″	° ′ ″	° ′ ″
Sept. 1	30.30	50	21 33 41.7	33 37.0	33 48	33 45.3
3	30.00	54	„ „ 40.0	„ 41.0	„ 44.7	„ 48.5
10	30.05	55	„ „ 42.0	„ 40.6	„ 43.8	„ 44.0
19	30.14	60.8	„ „ 42.7	„ 37.0	„ 44	„ 39
21	29.70	67	„ „ 41.3	„ 34.3	„ 42.7	„ 47.7
23	29.82	68	„ „ 41.2	„ 39.2	„ 37.9	„ 41.5
25	29.77	65	„ „ 46.0	„ 40.4	„ 46.0	„ 45.2
26	29.95	73.5	„ „ 40.0	„ 35.0	„ 44.5	„ 46.4
Sept. 16	... Mean ...		21 33 41.8	33 38.1	33 43.8	33 44.5
	Refract. and Reduct.		−34.0	34.1	34.1	34.1
	Superior Culminat.		21 33 7.8	33 4.0	33 9.7	33 10.4
	Inferior Culminat...		338 56 41.5	56 45.8	56 55.3	56 54.6
	Half Diff. S. P. D.		21 18 13.2	18 9.1	18 7.3	18 7.9

Inferior Culmination.

1827.	Barom.	Therm.	Microscopes. I.	II.	III.	IV.
	inches.	°	° ′ ″	° ′ ″	° ′ ″	° ′ ″
Sept. 1	30.23	40	339 1 13.5	1 12.0	1 28.3	1 22.7
2	30.07	39.5	„ „ 8.8	„ 14.7	„ 25.5	„ 24.3
10	29.79	42.5	„ „ 3.0	„ 7.0	„ 17.0	„ 20.0
13	29.83	41.4	„ „ 6.0	„ 12.6	„ 20.0	„ 17.3
18	30.05	41.5	„ „ 5.0	„ 7.5	„ 19.5	„ 22.0
23	29.67	56	„ „ 1.3	„ 12.3	„ 18.2	„ 17.7
30	30.13	42.3	„ „ 15.0	„ 14.0	„ 22.0	„ 21.2
Oct. 3	30.08	40	„ „ 3.2	„ 10.3	„ 16.2	„ 16.6
Sept. 16	... Mean ...		339 1 7.0	1 11.3	1 20.8	1 20.15
	Refract. and Reduct.		−4 25.5	4 25.5	4 25.5	4 25.5
			338 56 41.5	56 45.8	56 55.3	56 54.65

Mean of 4 Microscopes ..... 21° 18′ 9″.34 by 16 Observ.

1827.	Barom.	Therm.	Microscopes. I.	II.	III.	IV.
	inches.	°	° ′ ″	° ′ ″	° ′ ″	° ′ ″
Dec. 15	30.34	80.7	21 33 47.1	33 45	33 47	33 50
16	30.21	81.3	„ „ 49.0	„ 43	„ 51.4	„ 41
17	30.02	89.5	„ „ 44.0	„ 43.2	„ 50.8	„ 37.3
Dec. 16	... Mean ...		21 33 46.7	33 43.7	33 49.8	33 42.8
	Refract. and Reduct.		−50.1	50.2	50.1	50.2
	Superior Culminat.		21 32 56.6	32 53.5	32 59.7	32 52.6
	Inferior Culminat...		338 56 22.5	56 30.0	56 27.7	56 33.1
	Half Diff. S. P. D.		21 18 17.0	18 11.8	18 16.0	18 9.7

1827.	Barom.	Therm.	Microscopes. I.	II.	III.	IV.
	inches.	°	° ′ ″	° ′ ″	° ′ ″	° ′ ″
Dec. 5	29.97	63	339 0 21.0	0 25.7	0 34.3	0 35.5
12	29.68	71	„ „ 12.2	„ 21.0	„ 31.8	„ 27.8
16	30.225	59	„ „ 22.5	„ 31.1	„ 37.0	„ 29.0
17	30.134	60	„ „ 20.0	„ 28.5	„ 35.5	„ 31.1
18	29.92	67.2	„ „ 15.0	„ 22.0	„ 29	„ 19.7
28	30.08	63	„ „ 10.0	„ 17.3	„ 24.3	„ 21.2
Dec. 16	... Mean ...		339 0 16.8	0 24.3	0 22.0	0 27.4
	Refract. and Reduct.		−3 54.3	3 54.3	3 54.3	3 54.3
			338 56 22.5	56 30.0	56 27.7	56 33.1

Mean Inside Temperature 75°.

Mean of 4 Microscopes.....21° 18′ 13″.64 by 9 Observ.

α Trianguli. (Ann. Var. — 7″.71.)—(Continued.)

Superior Culmination.

1828.	Barom.	Therm.	Microscopes. I.	II.	III.	IV.
	inches.	°	′ ″	′ ″	′ ″	′ ″
Jan. 21	29.76	67	21 33 34.2	33 36.5	33 43.5	33 38.5
27	30.19	66.3	„ „ 37.2	„ 35.4	„ 41.6	„ 42
28	30.10	67	„ „ 31.3	„ 30.5	„ 37.0	„ 28
30	29.99	77	„ „ 30.0	„ 25.8	„ 31.5	„ 35
Feb. 11	29.86	63	„ „ 26	„ 24.3	„ 27.5	„ 22.3
12	29.99	68	„ „ 18.7	„ 19	„ 23.9	„ 19.2
13	29.98	75	„ „ 20.8	„ 17.5	„ 26.3	„ 21.0
15	29.92	63	„ „ 26.9	„ 21.2	„ 23.5	„ 25.0
18	30.26	57	„ „ 20.0	„ 21.7	„ 25.5	„ 22
19	30.17	60	„ „ 19.1	„ 16.4	„ 16.2	„ 15.5
20	30.15	61.2	„ „ 15.0	„ 14.2	„ 13.7	„ 16.0
21	30.07	61	„ „ 10.0	„ 10.5	„ 16.1	„ 11.8
22	29.89	61.2	„ „ 14.0	„ 10.0	„ 16.6	„ 12.0
Feb. 1	... Mean ...		21 33 22.8	33 21.8	33 26.3	33 23.5
Refract. and Reduct.			—58.7	58.8	58.7	58.8
Superior Culminat.			21 32 24.1	32 23.0	32 27.6	32 24.7
Inferior Culminat.			338 56 0.0	56 10.2	56 15.6	56 11.2
Half Diff. S. P. D.			21 18 12.0	18 6.4	18 6.0	18 6.8

Inferior Culmination.

1827.	Barom.	Therm.	Microscopes. I.	II.	III.	IV.
	inches.	°	′ ″	′ ″	′ ″	′ ″
Dec. 18	29.92	67	339 0 15	0 22	0 29	0 19.7
28	30.09	63	339 0 10	0 17.3	0 24.3	0 21.2
1828.						
Jan. 14	30.21	63.7	339 0 1.5	0 9.8	0 13.4	0 10.3
15	30.19	64.1	339 0 3.0	0 15.0	0 18.7	0 11.7
21	29.79	74	338 59 47	59 54.7	0 0.1	59 55.0
28	30.12	60.3	338 59 59.8	0 5.4	0 15.0	0 8.9
29	29.96	65.6	338 59 49	59 58.3	0 3.7	0 2.2
30	29.95	63	338 59 17.7	59 56.2	0 2.4	59 52
31	29.99	60	338 59 42.0	59 50.7	59 58.2	59 52
Feb. 2	29.86	70.2	338 59 40.0	59 50.0	59 58	59 50
6	29.70	70.5	338 59 36.5	59 48.5	59 48.7	59 45
8	29.95	73	338 59 34.3	59 45.7	59 49.7	59 47
12	29.85	77.5	338 59 29.7	59 39.5	59 46.0	59 41.3
13	29.81	77	338 59 33.0	59 39.3	59 47.7	59 42
15	29.94	72.5	338 59 39.8	59 40.5	59 46.0	59 39
19	30.16	72.2	338 59 33	59 35.5	59 39.0	59 46
Jan. 28	... Mean ...		338 59 45.3	59 55.5	0 0.9	59 56.5
Refract. and Reduct.			—3 45.3	3 45.3	3 45.3	3 45.3
			338 56 0.0	56 10.2	56 15.6	56 11.2

Mean Inside Temperature 74°.6.

Mean of 4 Microscopes ..... 21° 12′ 7″.8 by 20 Observ.

α Tranguli. (Ann. Var. — 7″.71.)—(Continued.)

Superior Culmination.

1828.	Barom.	Therm.	Microscopes. I.	II.	III.	IV.
	inches.	°	′ ″	′ ″	′ ″	′ ″
Aug. 10	30.21	46.5	21 32 20	32 22.1	32 27	32 18
17	29.48	62.7	„ „ 20	„ 15.7	„ 21.7	„ 20
22	30.20	49.0	„ „ 13	„ 12	„ 16	„ 12.5
25	29.71	68	„ „ 13.2	„ 12.5	„ 17.3	„ 9.4
26	29.82	65	„ „ 9.5	„ 8.7	„ 12.8	„ 8.0
27	29.93	63	„ „ 8.0	„ 9.8	„ 11.4	„ 7.3
28	30.27	52.7	„ „ 9.2	„ 7.0	„ 11.5	„ 8.0
29	30.10	61.3	„ „ 10.2	„ 12.0	„ 12.0	„ 8.8
30	30.24	64.7	„ „ 11.3	„ 11.5	„ 13.0	„ 8.0
31	30.30	58.5	„ „ 8.0	„ 8.0	„ 13	„ 6.7
Sept. 1	30.20	68	„ „ 9.0	„ 5.7	„ 12	„ 6.5
2	30.15	67	„ „ 0.5	„ 4.0	„ 7.3	„ 0.0
3	30.05	65	„ „ 6.0	„ 1.0	„ 3.0	„ 4.6
8	29.80	62.7	„ „ 6	„ 3.2	„ 12.2	„ 3
9	29.79	63.7	„ „ 4.0	„ 6.3	„ 7.0	„ 2
10	29.84	54	„ „ 12.3	„ 5.0	„ 8.3	„ 5
11	30.08	54	„ „ 5.4	„ 3.3	„ 14.0	„ 2
Aug. 24	... Mean ...		21 32 9.7	32 8.7	32 12.9	32 7.6
Refract. and Reduct.			−26.6	26.7	26.6	26.7
Superior Culminat.			21 31 43.1	31 42.0	31 46.3	31 40.9
Inferior Culminat...			338 55 19.6	55 23.5	55 30.0	55 25.4
Half Dif. S. P. D.			21 18 11.7	18 9.3	18 8.6	18 7.8

Inferior Culmination.

1828.	Barom.	Therm.	Microscopes. I.	II.	III.	IV.
	inches.	°	° ′ ″	′ ″	′ ″	′ ″
Aug. 20	30.09	38.3	338 59 53	59 53.3	0 3	59 56.5
21	30.14	38.5	338 59 55	0 0.0	0 7.5	0 0.6
23	30.05	35	338 59 54	0 2.0	0 6.0	0 1.5
25	29.81	42	338 59 50	59 54.3	59 59.3	59 53.0
26	29.95	42	338 59 50.3	59 55	59 56	59 53
27	30.24	35.3	338 59 57.0	0 2	0 6	0 2.4
28	30.24	33	338 59 56.7	59 58.7	0 4.2	0 2.0
29	30.17	34	339 0 0	0 3	0 9.4	0 6.0
31	30.25	45	338 59 50	59 55	0 1.0	59 59.0
Sept. 1	30.23	44	338 59 48.5	59 51	0 4.2	59 56
4	29.85	48	338 59 40.0	59 41.0	59 50.5	59 48
8	29.90	41.5	338 59 45	59 47.2	59 54.7	59 47
9	29.80	45	338 59 39	59 44.7	59 50.4	59 46.3
10	29.91	37	338 59 46	59 50.5	59 57.0	59 54.3
11	30.23	36	338 59 50.4	59 56.5	0 2.2	59 58.0
Aug. 31	... Mean ...		338 59 50.3	59 54.3	0 0.7	59 56.2
Refract. and Reduct.			−4 30.7	4 30.8	4 30.7	4 30.8
			338 55 19.6	55 23.5	55 30.0	55 25.4

Mean of 4 Microscopes ..... 21° 18′ 9″.35 by 32 Observ.

Mean S. P. D. of α Trianguli, Jan. 1, 1828 ..... 21° 18′ 9″.155 by 116 Observ.

α Muscæ. (Ann. Var. — 19″.875.)

Superior Culmination.

1822.	Barom.	Therm.	Microscopes. I.	II.	III.	IV.
	inches.	°	° ′ ″	° ′ ″	° ′ ″	° ′ ″
May 21	29.98	50	21 50 45.5	50 13.5	50 55.0	50 44.3
28	30.00	53	„ „ 41.0	„ 19.0	50 53.0	„ 45.7
June 2	29.85	51	„ „ 52.7	„ 4.5	51 3.7	„ 57.5
3	29.76	51	„ „ 40.3	„ 34.0	50 55.0	„ 47.4
5	30.00	50	„ „ 46.7	„ 29.2	50 55	„ 42.0
10	29.80	57.5	„ „ 51.0	„ 40.0	51 4	„ 56
12	29.75	59.7	„ „ 47	„ 29.0	50 56	„ 46.8
13	29.90	49	„ „ 49.4	„ 25.7	50 58.3	„ 50.0
15	30.12	47	„ „ 45	„ 26.5	50 53.7	„ 42.5
22	29.68	51	„ „ 56.9	„ 36.3	51 5	„ 52.2
June 7	... Mean ...		21 50 47.5	50 25.7	50 58.1	50 48.4
Refract. and Reduct.			−2 6.5	2 6.5	2 6.6	2 6.6
Superior Culminat.			21 48 41.0	48 19.2	48 51.5	48 41.8
Inferior Culminat...			338 11 0.7	10 41.3	11 19.4	11 12.2
Half Diff. S. P. D.			21 48 50.15	48 49.0	48 46.0	48 44.8

1822.	Barom.	Therm.	Microscopes. I.	II.	III.	IV.
	inches.	°	° ′ ″	° ′ ″	° ′ ″	° ′ ″
June 30	29.998	51	59 46 57	46 43	47 0.5	46 57.5
July 3	30.032	53	„ „ 46.4	„ 34	46 58.7	„ 53.3
4	29.90	52	„ „ 54	„ 39	47 6.0	„ 59.0
5	29.91	46	„ „ 56	„ 39	47 0.0	„ 55.0
6	29.77	50	„ „ 55	„ 37	46 56.0	„ 54
July 3,7	...Mean...		59 46 53.7	46 38.4	47 0.2	46 55.8
Refract. and Reduct.			−2 4.8	2 4.9	2 4.8	2 4.9
Superior Culminat.			59 44 48.9	44 33.5	44 55.4	44 50.9
Inferior Culminat...			16 7 10.7	6 51.2	7 23.7	7 15.6
Half Diff. S. P. D.			21 48 49.1	48 51.1	48 45.9	48 47.6

Inferior Culmination.

1822.	Barom.	Therm.	Microscopes. I.	II.	III.	IV.
	inches.	°	° ′ ″	° ′ ″	° ′ ″	° ′ ″
June 15	30.05	35	338 14 9	13 45	14 22.8	14 16.8
16	30.06	36	„ „ 4	„ 47	„ 27.3	„ 20.0
20	30.00	30	„ „ 16	„ 58.7	„ 34.0	„ 21.7
21	29.74	41	„ „ 2.7	„ 42.6	„ 21.8	„ 18.4
22	29.68	37	„ „ 10.5	„ 52.3	„ 30.7	„ 23.2
June 19	... Mean ...		338 14 8.44	13 49.1	14 27.1	14 20.0
Refract. and Reduct.			−3 7.7	3 7.8	3 7.7	3 7.8
			338 11 0.7	10 41.3	11 19.4	11 12.2

Mean of 4 Microscopes ..... 21° 48′ 47″.49 by 15 Observ.

1822.	Barom.	Therm.	Microscopes. I.	II.	III.	IV.
	inches.	°	° ′ ″	° ′ ″	° ′ ″	° ′ ″
July 4	29.93	35	16 10 24	10 8	10 36.5	10 29.5
5	29.90	36.2	„ „ 17.5	„ 54.3	„ 31.2	„ 22.0
7	29.41	41.9	„ „ 10	„ 51.0	„ 23	„ 15
July 5,8	...Mean...		16 10 17.2	9 57.8	10 30.2	10 22.2
Refract. and Reduct.			−3 6.5	3 6.6	3 6.5	3 6.6
			16 7 10.7	6 51.2	7 23.7	7 15.6

Mean of 4 Microscopes.....21° 48′ 48″.44 by 8 Observ.

α Muscæ. (Ann. Var. — 19″.875.)—(Continued.)

Superior Culmination.

1826.	Barom.	Therm.	Microscopes. I.	II.	III.	IV.
	inches.	°	′ ″	′ ″	′ ″	′ ″
July 10	29.83	48	22 30 43	30 20.7	30 22.4	30 30
12	29.84	53	„ „ 24.5	„ 20.3	„ 23.2	„ 28.5
13	30.06	50	„ „ 23.4	„ 18.5	„ 23.1	„ 26.9
July 11.7...Mean...			22 30 23.6	30 19.8	30 22.6	30 28.5
Refract. and Reduct.			−47.9	47.9	47.9	47.9
Superior Culminat.			22 29 35.7	29 31.9	29 34.7	29 40.6
Inferior Culminat...			338 52 0.9	51 57.4	52 1.8	52 8.6
Half Diff. S. P. D.			21 48 47.4	48 47.2	48 46.5	48 46

Inferior Culmination.

1826.	Barom.	Therm.	Microscopes. I.	II.	III.	IV.
	inches.	°	′ ″	′ ″	′ ″	′ ″
July 9	30.09	33.5	338 56 55	56 52	56 33.5	56 40.7
12	30.00	32.0	338 56 28	56 24	56 31.4	56 38.0
July 10.7...Mean...			338 56 31.5	56 28.0	56 32.4	56 39.3
Refract. and Reduct.			−4 30.6	4 30.6	4 30.6	4 30.7
			338 52 0.9	51 57.4	52 1.8	52 8.6

Mean of 4 Microscopes.....21° 48′ 46″.8 by 5 Observ.

Superior Culmination.

1827.	Barom.	Therm.	Microscopes. I.	II.	III.	IV.
	inches.	°	′ ″	′ ″	′ ″	′ ″
June 1	30.30	56.5	22 4 14	4 11.3	4 24.7	4 25.3
2	30.21	50.3	„ „ 20.3	„ 19.0	„ 26.3	„ 24.0
15	29.95	56	„ „ 17.5	„ 21.7	„ 32.3	„ 27.0
24	29.87	46	„ „ 18.2	„ 22.0	„ 28.2	„ 28.2
25	30.07	56.5	„ „ 16.0	„ 17.5	„ 23.5	„ 29.0
July 3	30.14	48.5	„ „ 19	„ 18.0	„ 27.0	„ 27.0
4	30.34	58	„ „ 20.8	„ 19.7	„ 23.2	„ 26.0
10	30.13	53	„ „ 17.0	„ 17.3	„ 30.2	„ 27
June 21.5...Mean...			22 4 17.8	4 18.3	4 26.9	4 26.7
Refract. and Reduct.			−28.2	28.2	28.2	28.3
Superior Culminat.			22 3 49.6	3 50.1	3 58.7	3 58.4
Inferior Culminat...			338 26 10.9	26 10.2	26 18.8	26 21.2
Half Diff. S. P. D.			21 48 49.3	48 50.0	48 49.9	48 48.6

Inferior Culmination.

1827.	Barom.	Therm.	Microscopes. I.	II.	III.	IV.
	inches.	°	′ ″	′ ″	′ ″	′ ″
June 15	30.00	40	338 30 55	30 50.3	31 4.7	31 5.0
23	29.48	47	„ 30 48.3	30 46.0	30 53.5	30 56.1
24	30.00	44	„ 30 51.0	30 50.6	30 58.5	31 3.2
26	30.05	45	„ 30 54.0	30 56.0	31 4.3	31 7.5
29	29.99	34	„ 31 1.0	30 59.0	31 8.5	31 8.8
July 2	29.95	51	„ 30 46.5	30 44.0	30 52	30 58.7
3	30.25	37	„ 30 57.0	30 58	31 3.5	31 5.3
4	30.35	38.5	„ 30 56.0	31 1.1	31 8.4	31 9.9
7	30.33	47	„ 30 54.5	30 59.7	31 0.8	31 2.5
June 24.... Mean ...			338 30 53.7	30 53.1	31 1.6	31 4.1
Refract. and Reduct.			−4 42.8	4 42.9	4 42.8	4 42.9
			338 26 10.9	26 10.2	26 18.8	26 21.2

Mean of 4 Microscopes ..... 21° 48′ 49″.46 by 17 Observ.

α Muscæ. (Ann. Var. − 19″.875.)—(Continued.)

Superior Culmination.

1828.	Barom.	Therm.	Microscopes. I.	II.	III.	IV.
	inches.	°	′ ″	′ ″	′ ″	′ ″
June 8	29.40	55	22 2 9.5	2 15.2	2 26	2 11
16	29.81	55	„ „ 13.4	„ 10.2	„ 19.3	„ 13
17	30.03	51.5	„ „ 13.0	„ 11.5	„ 18.0	„ 12
18	30.20	49.5	„ „ 18.0	„ 14.0	„ 21.2	„ 17.0
19	30.34	49.5	„ „ 18.0	„ 11.4	„ 21.3	„ 15.0
20	30.27	52	„ „ 13.0	„ 10.4	„ 22	„ 13.3
28	30.22	58	„ „ 8	„ 7.8	„ 16.8	„ 8.7
July 1	29.75	58	„ „ 16.5	„ 14.0	„ 22.7	„ 15.8
2	29.84	53	„ „ 16.0	„ 13.7	„ 22.2	„ 17.0
3	29.69	56	„ „ 20	„ 17.0	„ 25.0	„ 20.9
5	30.13	58.5	„ „ 20.5	„ 16.3	„ 25.4	„ 18.2
6	30.20	58.5	„ „ 18.0	„ 18.0	„ 27.0	„ 20.8
10	29.81	57	„ „ 18.2	„ 17.0	„ 25	„ 21
11	30.05	50.2	„ „ 20.4	„ 18.5	„ 25.7	„ 20.2
14	29.96	50.0	„ „ 22.0	„ 18.0	„ 29.2	„ 22.5
15	30.00	59.2	„ „ 18.8	„ 18.0	„ 28.2	„ 23.0
17	29.66	66	„ „ 23.6	„ 17.0	„ 25.0	„ 26.3
18	29.87	62	„ „ 20.0	„ 15.5	„ 24.0	„ 24.0
June 29	... Mean ...		22 2 17.0	2 14.6	2 23.5	2 17.7
Refract. and Reduct.			−8.7	8.8	8.7	8.8
Superior Culminat.			22 2 8.3	2 5.8	2 14.8	2 8.9
Inferior Culminat...			338 24 29.8	24 28.8	24 35.8	24 36.6
Half Diff. S. P. D.			21 48 49.2	48 48.4	48 49.5	48 46.2

Inferior Culmination.

1828.	Barom.	Therm.	Microscopes. I.	II.	III.	IV.
	inches.	°	′ ″	′ ″	′ ″	′ ″
June 16	30.09	38	338 29 23.4	29 24.5	29 31	29 31
17	30.13	35.5	„ „ 29.3	„ 28.0	„ 33.6	„ 34
18	30.32	37	„ „ 31.0	„ 29.3	„ 38	„ 35.3
29	30.13	48.8	„ „ 19.0	„ 18.3	„ 23.2	„ 29
July 3	29.72	37.7	„ „ 32	„ 32.3	„ 35.8	„ 38
10	29.98	37	„ „ 32.3	„ 33.5	„ 40.0	„ 40
11	29.94	33	„ „ 38.5	„ 38	„ 46.3	„ 45
14	29.99	41.7	„ „ 30.0	„ 27.0	„ 36	„ 38.8
15	30.02	33.2	„ „ 43.3	„ 40.0	„ 46	„ 50
16	29.72	57.7	„ „ 24.2	„ 21	„ 28.7	„ 30
18	30.00	39	„ „ 31.1	„ 29.7	„ 38.5	„ 38.3
19	29.56	44.4	„ „ 38.3	„ 39.5	„ 46.0	„ 45.0
July 5	... Mean ...		338 29 31.0	29 30.0	29 37	29 37.9
Refract. and Reduct.			−5 1.2	5 1.2	5 1.2	5 1.2
			338 24 29.8	24 28.8	24 35.8	24 36.6

Mean of 4 Microscopes.....21° 48′ 48″.45 by 30 Observ.

1828.	Barom.	Therm.	Microscopes. I.	II.	III.	IV.
	inches.	°	′ ″	′ ″	′ ″	′ ″
July 21	29.59	.....	22 2 44.0	2 32.0	2 42.0	2 36.2
22	30.00	57	„ „ 41.3	„ 36.0	„ 39	„ 43.0
24	30.07	57	„ „ 44.0	„ 37.5	„ 46.7	„ 50
26	30.20	59	„ „ 49.0	„ 43.8	„ 51.7	„ 48.3
29	30.00	56	„ „ 54.0	„ 43.4	„ 54.0	„ 55.0
Aug. 4	30.17	60.8	„ „ 50.0	„ 46.2	„ 52.8	„ 48.5
July 26	... Mean ...		22 2 47.05	2 39.8	2 47.7	2 47.0
Refract. and Reduct.			−11.1	11.1	11.1	11.1
Superior Culminat.			22 2 35.9	2 28.7	2 36.6	2 35.9
Inferior Culminat...			338 24 50.4	24 51.7	24 56.7	24 58.2
Half Diff. S. P. D.			21 48 52.8	48 48.5	48 49.9	48 48.8

1828.	Barom.	Therm.	Microscopes. I.	II.	III.	IV.
	inches.	°	′ ″	′ ″	′ ″	′ ″
July 25	30.14	37	338 29 55.4	29 55	30 0.0	29 59.3
26	30.29	35	338 29 53.4	29 56.3	30 1.5	30 5.2
July 25.5	...Mean...		338 29 54.4	29 55.7	30 0.75	30 2.2
Refract. and Reduct.			−5 4.0	5 4.0	5 4.0	5 4.0
			338 24 50.4	24 51.7	24 56.7	24 58.2

Mean of 4 Microscopes.....21° 48′ 50″.01 by 8 Observ.

Mean S. P. D. of α Muscæ, Jan. 1, 1828 ..... 21° 48′ 48″.54 by 83 Observ.

ε Piscis Volantis. (Ann. Var. — 10″.554.)

Superior Culmination.								Inferior Culmination.							
1828.	Barom.	Therm.	Microscopes. I.	II.	III.	IV.		1828.	Barom.	Therm.	Microscopes. I.	II.	III.	IV.	
	inches.								inches.						
Apr. 18	30.06	59.5	22 6 53	6 55	7 6.7	6 53		Apr. 25	30.00	48.5	338 25 6	25 8	25 15	25 9.3	
26	29.92	62.5	„ „ 53.7	„ 50.4	„ 1.3	„ 48.7		Refract. and Reduct.			−5 0.5	5 0.5	5 0.5	5 0.5	
27	29.82	64	„ „ 50.0	„ 51.7	„ 1.4	„ 49.0					338 20 5.5	20 7.5	20 14.5	20 8.8	
Apr. 24... Mean ...			22 6 52.2	6 52.4	7 3.1	6 50.2									
Refract. and Reduct.			−6.8	6.8	6.8	6.8									
Superior Culminat.			22 6 45.4	6 45.6	6 54.3	6 43.4									
Inferior Culminat...			338 20 5.5	20 7.5	20 14.5	20 8.8									
Half Diff. S. P. D.			21 53 19.9	53 19.1	53 19.9	53 17.3									

Mean S. P. D. of ε Piscis Volantis, Jan. 1, 1828 . . . . . 21° 53′ 19″.05 by 4 Observ.

γ Trianguli. (Ann. Var. — 13″.980.)

Superior Culmination.								Inferior Culmination.							
1822.	Barom.	Therm.	Microscopes. I.	II.	III.	IV.		1822.	Barom.	Therm.	Microscopes. I.	II.	III.	IV.	
	inches.								inches.						
Aug. 12	29.974	54	59 55 13.5	55 23	55 19	55 20.6		Aug. 11	30.022	41.5	16 1 38	1 43.5	1 49	1 38.7	
13	29.82	55	„ „ 21.5	„ 23	„ 14	„ 12.2		12	29.90	38.7	„ „ 38	1 52.0	„ 44.8	„ 45.3	
14	30.07	52	„ „ 20.0	„ 29	„ 12	„ 15.0		16	30.10	49.2	„ „ 30.8	1 49.5	„ 39.7	„ 35.0	
15	30.12	56.4	„ „ 8.0	„ 14.3	„ 10.0	„ 8.0		24	30.13	40.5	„ „ 36.3	2 5.0	„ 46.7	„ 36.0	
22	29.88	55	„ „ 14.0	„ 23.6	„ 13.8	„ 16.7		26	29.55	44	„ „ 26.0	1 56.2	„ 31.0	„ 27.0	
23	29.89	59	„ „ 14.2	„ 44.0	„ 15.5	„ 17.0		31	29.78	48.5	„ „ 25.4	.....	„ 35.6	„ 28.8	
25	30.04	60	„ „ 8.5	„ 40.0	„ 7.5	„ 13.0									
27	29.54	54.5	„ „ 11.3	„ 44	„ 14.3	„ 15.6		Aug. 15... Mean ...			16 1 32.5	1 53.2	1 41.1	1 35.1	
Aug. 19... Mean ...			59 55 14.0	55 30.1	55 13.3	55 14.4		Refract. and Reduct.			−3 40.4	3 40.4	3 40.4	3 40.4	
Refract. and Reduct.			−1 30.5	1 30.5	1 30.5	1 30.5					15 57 52.1	58 12.8	58 0.7	57 54.7	
Superior Culminat.			59 53 43.5	53 59.6	53 42.8	53 43.9									
Inferior Culminat...			15 57 52.1	58 12.8	58 0.7	57 54.7									
Half Diff. S. P. D.			21 57 55.7	57 53.4	57 51.0	57 54.6		Mean of 4 Microscopes.....21° 57′ 53″.7 by 14 Observ.							

1826.	Barom.	Therm.	Microscopes. I.	II.	III.	IV.		1826.	Barom.	Therm.	Microscopes. I.	II.	III.	IV.	
	inches.								inches.						
Aug. 9	30.142	54	22 39 32.5	39 29.2	39 28.2	39 30.8		July 26	29.56	39	338 47 18.3	47 10.0	47 20.3	47 24.3	
11	29.854	57	„ „ 28.4	„ 24.0	„ 19.3	„ 28.0		29	30.38	35.2	338 47 30.0	47 20.0	47 35.0	47 30.5	
12	30.062	57.5	„ „ 26.7	„ 28.6	„ 23.3	„ 28.0		July 27.5... Mean...			338 47 24.1	47 15.0	47 27.6	47 27.4	
Aug. 16... Mean ...			22 39 29.2	39 27.3	39 23.6	39 28.9		Refract. and Reduct.			−4 34.1	4 34.1	4 34.1	4 34.1	
Refract. and Reduct.			−41.7	41.8	41.7	41.8					338 42 50.0	42 40.9	42 53.5	42 53.3	
Superior Culminat.			22 38 47.5	38 45.5	38 41.9	38 47.1									
Inferior Culminat...			338 42 50.0	42 40.9	42 53.5	42 53.3									
Half Diff. S. P. D.			21 57 58.7	58 2.3	57 54.2	57 56.9		Mean of 4 Microscopes.....21° 57′ 58″.04 by 5 Observ.							

γ Trianguli. (Ann. Var. — 13″.980.)—(Continued.)

Superior Culmination.

1827.	Barom.	Therm.	Microscopes. I.	II.	III.	IV.
	inches.	°	° ′ ″	′ ″	′ ″	′ ″
July 30	30.01	.....	22 13 28.3	13 21	13 30.5	13 40
Aug. 2	30.05	39	„ „ 27.0	„ 26	„ 38.8	„ 38.7
6	30.10	51	„ „ 22.3	„ 25.5	„ 34.3	„ 41.2
7	30.10	63	„ „ 25	„ 23.3	„ 37.2	„ 39.4
Aug. 3.5...	Mean...		22 13 25.6	13 24.0	13 35.2	13 39.9
Refract. and Reduct.			−31.1	31.1	31.1	31.0
Superior Culminat.			22 12 54.5	12 52.9	13 4.1	13 8.9
Inferior Culminat...			338 17 1.6	17 7.2	17 12.8	17 15.4
Half Diff. S. P. D.			21 57 56.4	57 52.9	57 55.7	57 56.7

Inferior Culmination.

1827.	Barom.	Therm.	Microscopes. I.	II.	III.	IV.
	inches.		° ′ ″	′ ″	′ ″	′ ″
July 26	30.18	48.5	338 21 48	21 53	21 47.0	21 59
30	29.81	54	„ „ 28	„ 25.3	„ 40.8	„ 40
31	30.04	48	„ „ 34	„ 38.6	„ 46.7	„ 46.4
Aug. 2	30.07	32.7	„ „ 49.3	„ 52.7	„ 57.7	„ 57.5
July 30...	Mean ...		338 21 36.8	21 42.4	21 48.0	21 50.7
Refract. and Reduct.			−4 35.2	4 35.2	4 35.2	4 35.3
			338 17 1.6	17 7.2	17 12.8	17 15.4

Mean of 4 Microscopes.....21° 57′ 55″.42 by 8 Observ.

1828.

1828.	Barom.	Therm.	Microscopes. I.	II.	III.	IV.
	inches.	°	° ′ ″	′ ″	′ ″	′ ″
Aug. 1	30.20	50	22 12 7.0	12 3.0	12 10.6	12 7.3
2	30.18	49	„ 12 1.7	12 2.0	12 10.7	12 5.0
3	30.18	50	„ 12 3.0	12 5.0	12 12.1	12 7.4
11	30.20	.....	„ 12 0.0	11 58.0	12 5.0	12 0.8
15	29.72	58	„ 11 52.8	11 52.0	12 2.5	11 56.3
21	30.09	57	„ 11 56.0	11 46.5	11 59.0	11 55.5
25	29.71	73	„ 11 54	11 44.0	11 56.7	11 57.0
26	29.79	68.3	„ 11 52	11 46.4	12 0.0	11 57.0
27	29.93	65	„ 11 49	11 43.0	11 54.0	11 47.0
Aug. 14.5...	Mean...		22 11 57.3	11 53.3	12 3.4	11 59.3
Refract. and Reduct.			−19.0	19.0	19.0	19.0
Superior Culminat.			22 11 38.3	11 34.3	11 44.4	11 40.3
Inferior Culminat...			338 15 38.9	15 37.7	15 43.9	15 44.0
Half Diff. S. P. D.			21 57 59.7	57 58.3	58 0.2	57 58.2

Inferior Culmination.

1828.	Barom.	Therm.	Microscopes. I.	II.	III.	IV.
	inches.		° ′ ″	′ ″	′ ″	′ ″
July 31	30.20	31.5	338 20 49.3	20 47.0	20 56	20 54.3
Aug. 2	30.18	37	„ „ 48.0	„ 52	„ 54.5	„ 53.7
3	30.22	34	„ „ 47.6	„ 46.3	„ 55	„ 55.0
9	29.76	48	„ „ 32	„ 32.0	„ 39.3	„ 39.0
13	30.05	40	„ „ 36.7	„ 34.0	„ 42.0	„ 41.7
15	29.67	45	„ „ 27.0	„ 22.5	„ 28.3	„ 32.8
17	29.31	60	„ „ 12.0	„ 12.0	„ 11.4	„ 18.3
23	30.05	37.3	„ „ 36.0	„ 33.3	„ 39.2	„ 36.4
25	29.81	42.5	„ „ 21.0	„ 19.5	„ 25.5	„ 26.7
27	30.20	35	„ „ 26.0	„ 26.0	„ 34.5	„ 30.7
28	30.25	36	„ „ 32	„ 30.0	„ 37.0	„ 35.0
Aug. 15...	Mean ...		338 20 33.4	20 32.2	20 38.4	20 38.5
Refract. and Reduct.			−4 54.5	4 54.5	4 54.5	4 54.5
			338 15 38.9	15 37.7	15 43.9	15 44.0

Mean of 4 Microscopes.....21° 57′ 59″.1 by 20 Observ.

Mean S. P. D. of γ Trianguli, Jan. 1, 1828 . . . . . 21° 57′ 56″.63 by 47 Observ.

δ Pavonis. (Ann. Var. — 9″.406.)

Superior Culmination.

1828.	Barom.	Therm.	Microscopes. I.	II.	III.	IV.
	inches.	°	′ ″	′ ″	′ ″	′ ″
Apr. 10	29.85	61.5	23 38 10	38 11.2	38 14.6	38 13
17	30.07	49.5	„ „ 3.7	„ 11.5	„ 13.3	„ 7.0
May 1	30.27	47.0	„ „ 4.0	„ 11.0	„ 15.3	„ 8.8
Apr. 19.3...	Mean...		23 38 6	38 11.2	38 14.4	38 9.6
Refract. and Reduct.			−1 3.1	1 3.2	1 3.1	1 3.2
Superior Culminat.			23 37 2.9	37 8.0	37 11.3	37 6.4
Inferior Culminat...			336 49 45.6	49 48.1	49 55.7	49 52.1
Half Diff. S. P. D.			23 23 38.6	23 39.9	23 37.9	23 37.2

Inferior Culmination.

1828.	Barom.	Therm.	Microscopes. I.	II.	III.	IV.
	inches.	°	′ ″	′ ″	′ ″	′ ″
Apr. 9	29.66	73.5	336 54 17.0	54 13	54 21.7	54 22.1
11	29.86	63	„ „ 16.0	„ 18.2	„ 29.1	„ 28.3
12	29.95	62	„ „ 19.0	„ 20.1	„ 26.5	„ 22.7
14	30.20	60.2	„ „ 18.8	„ 21.0	„ 25.5	„ 20.0
17	30.06	62	„ „ 19.0	„ 21.3	„ 29.0	„ 25.3
18	30.06	59.5	„ „ 2.3	„ 11.2	„ 14.4	„ 11.1
20	29.83	69	„ „ 10.2	„ 14.3	„ 24.2	„ 19.5
24	29.83	61.5	„ „ 13.3	„ 18.8	„ 27.9	„ 23
27	29.82	64.2	„ „ 19.2	„ 19.7	„ 28.0	„ 21.3
Apr. 17...	Mean ...		336 54 15.0	54 17.5	54 25.1	54 21.5
Refract. and Reduct.			−4 29.4	4 29.4	4 29.4	4 29.4
			336 49 45.6	49 48.1	49 55.7	49 52.1

Mean S. P. D. of δ Pavonis, Jan. 1, 1828 . . . . . 23° 23′ 38″.4 by 12 Observ.

ε Trianguli. (Ann. Var. — 12″.82.)

1828.	Barom.	Therm.	Microscopes. I.	II.	III.	IV.
	inches.	°	′ ″	′ ″	′ ″	′ ″
Aug. 8	30.04	52	24 30 20	30 21	30 23	30 25
11	29.95	60	„ „ 21.5	„ 23.5	„ 27	„ 21.4
14	30.00	53	„ „ 16.5	„ 18.4	„ 25	„ 20
21	30.09	52.5	„ „ 10.5	„ 12.7	„ 14.5	„ 13.2
24	30.05	61.5	„ „ 17.0	„ 13.2	„ 14.0	„ 14.2
25	29.72	73	„ „ 9.0	„ 6.2	„ 11.0	„ 10.2
26	29.79	68.3	„ „ 12.5	„ 8.3	„ 9.0	„ 11.0
Aug. 18.4...	Mean...		24 30 15.2	30 14.8	30 17.7	30 16.4
Refract. and Reduct.			−17.5	17.5	17.5	17.6
Superior Culminat.			24 29 57.7	29 57.3	30 0.2	29 58.8
Inferior Culminat...			335 57 15.2	57 13.6	57 19.4	57 22.2
Half Diff. S. P. D.			24 16 21.2	16 21.9	16 20.4	16 18.3

1828.	Barom.	Therm.	Microscopes. I.	II.	III.	IV.
	inches.	°	′ ″	′ ″	′ ″	′ ″
Aug. 8	29.94	39.3	336 3 19.2	3 20.0	3 26.5	3 24.7
14	29.86	37	„ „ 13.7	3 11.0	„ 16.1	„ 20.0
15	29.67	44.5	„ „ 0.0	2 56.0	„ 4.0	„ 10.0
19	30.10	33	„ „ 14.0	3 12.0	„ 18.0	„ 22
20	30.09	39	„ „ 14.0	3 11.0	„ 14.0	„ 19.0
23	30.05	37.3	„ „ 16.2	3 16.0	„ 21.0	„ 22.7
26	29.87	44.0	„ „ 1.5	3 1.0	„ 8.2	„ 8.7
18...	Mean ...		336 3 11.2	3 9.6	3 15.4	3 18.2
Refract. and Reduct.			−5 56.0	5 56.0	5 56.0	5 56.0
			335 57 15.2	57 13.6	57 19.4	57 22.2

Mean S. P. D. of ε Trianguli, Jan. 1, 1828 . . . . . 24° 16′ 20″.45 by 14 Observ.

α Piscis Volantis. (Ann. Var. — 14″.12.)

Superior Culmination.

1822.	Barom.	Therm.	Microscopes. I.	II.	III.	IV.
	inches.	°	° ′ ″	″	″	″
May 23	29.77	66	24 18 39.5	18 5	18 46.0	18 51.0
Refract. and Reduct.			−1 38.2	1 38.2	1 38.2	1 38.2
Superior Culminat.			24 17 1.3	16 26.8	17 7.8	17 12.8
Inferior Culminat...			335 42 24.8	41 54.3	42 43.8	42 19.8
Half Diff. S. P. D.			24 17 18.2	17 16.3	17 12.0	17 26.5

Inferior Culmination.

1822.	Barom.	Therm.	Microscopes. I.	II.	III.	IV.
	inches.	°	° ′ ″	″	″	″
May 21	29.93	48.3	335 46 55.5	46 25.0	47 14.5	46 50.5
Refract. and Reduct.			−4 30.7	4 30.7	4 30.7	4 30.7
			335 42 24.8	41 54.3	42 43.8	42 19.8

Mean S. P. D. of α Piscis Volantis, Jan. 1, 1828 . . . . 24° 17′ 18″.25 by 2 Observ.

η Pavonis. (Ann. Var. — 2″.756.)

Superior Culmination.

1822.	Barom.	Therm.	Microscopes. I.	II.	III.	IV.
	inches.	°	° ′ ″	″	″	″
Sept. 15	29.75	53.5	63 18 36.8	17 56.3	18 41.2	18 42.2
16	29.84	51.5	„ „ 30.5	18 4.1	„ 38.2	„ 37.5
18	29.67	67.5	„ „ 32	17 50.8	„ 37.3	„ 37.0
Sept. 16.3... Mean...			63 18 3.1	17 57.1	18 39.3	18 39.0
Refract. and Reduct.			−25.31	25.3	25.3	25.4
Superior Culminat.			63 17 37.8	17 31.8	18 14.0	18 13.6
Inferior Culminat...			12 33 26.6	32 45.7	33 42.5	33 25.4
Half Diff. S. P. D.			25 22 5.6	22 23.0	22 15.8	22 24.1

Inferior Culmination.

1822.	Barom.	Therm.	Microscopes. I.	II.	III.	IV.
	inches.	°	° ′ ″	″	″	″
Sept. 16	29.87	36.5	12 39 49.2	39 [illegible]	40 5.1	39 50.4
Refract. and Reduct.			−6 22.6	6 22.6	6 22.6	6 25.0
			12 33 26.6	32 45.7	33 42.5	33 25.4

Mean S. P. D. of η Pavonis, Jan. 1, 1828 . . . . . 25° 22′ 17″.12 by 4 Observ.

υ Argus. (Ann. Var. — 16.″521.)

Superior Culmination.

1822.	Barom.	Therm.	Microscopes. I.	II.	III.	IV.
	inches.	°	° ′ ″	″	″	″
May 27	29.87	58.5	25 44 55.5	44 27.4	45 11.2	45 12.7
30	29.75	50	„ 44 54.0	„ 17.5	„ 11.5	„ 7.7
June 1	29.58	56	„ 44 59.5	.....	„ 13.4	„ 9.5
6	29.95	56	„ 45 0.5	.....	„ 13.8	„ 10.5
9	29.85	57.5	„ 44 53.1	.....	„ 13.0	„ 11.0
June 2... Mean ...			25 44 56.5	44 22.4	45 12.6	45 10.3
Refract. and Reduct.			−1 49.1	1 49.0	1 49.1	1 49.1
Superior Culminat.			25 43 7.4	42 33.4	43 23.5	43 21.2
Inferior Culminat...			334 16 15.1	16 0.7	16 33.4	16 19.6
Half Diff. S. P. D.			25 43 26.1	43 16.4	43 25.1	43 30.8

Inferior Culmination.

1822.	Barom.	Therm.	Microscopes. I.	II.	III.	IV.
	inches.	°	° ′ ″	″	″	″
May 26	29.84	48	334 21 33	21 10.8	21 51.0	21 38
30	29.63	51	334 21 17.7	21 11.0	21 36.3	21 21.7
May 28... Mean ...			334 21 25.3	21 10.9	21 43.6	21 29.8
Refract. and Reduct.			−5 10.2	5 10.2	5 10.2	5 10.2
			334 16 15.1	16 0.7	16 33.4	16 19.6

Mean S. P. D of υ Argus, Jan. 1, 1828 . . . . . 25° 43′ 47″.2 by 7 Observ.

θ Argus. (Ann. Var. — 18″.702.)

Superior Culmination.

1828.	Barom.	Therm.	Microscopes. I.	II.	III.	IV.
	inches.		h m s	h m s	h m s	h m s
May 31	29.82	55	26 43 26	43 34	43 37.5	43 34
June 6	29.70	52	„ „ 25.7	„ 36.2	„ 38.0	„ 35
8	29.40	55	„ „ 25.4	„ 35.0	„ 39.3	„ 36
10	29.72	52	„ „ 27.0	„ 36	„ 38.0	„ 36
June 6	... Mean ...		26 43 26.0	43 35.3	43 38.2	43 35.2
Refract. and Reduct.			0.0	0.0	0.0	0.0
Superior Culminat.			26 43 26.0	43 35.3	43 38.2	43 35.2
Inferior Culminat...			333 42 55.3	42 55.5	42 57.3	42 46.4
Half Diff. S. P. D.			26 30 15.3	30 19.9	30 20.5	30 24.4

Inferior Culmination.

1828.	Barom.	Therm.	Microscopes. I.	II.	III.	IV.
	inches.		h m s	h m s	h m s	h m s
June 6	29.57	39	333 50 23	50 31.9	50 35.0	50 23.2
9	29.69	50	333 50 19.3	50 29.0	50 29.4	50 19.5
June 7	.5... Mean...		333 50 30.15	50 30.4	50 32.2	50 21.3
Refract. and Reduct.			−7 34.9	7 34.9	7 34.9	7 34.9
			333 42 55.3	42 55.5	42 57.3	42 46.4

Mean S. P. D. of θ Argus, Jan. 1, 1828 . . . . . 26° 30′ 20″.05 by 6 Observ.

η Circini. (Ann. Var. — 14″.753.)

Superior Culmination.

1827.	Barom.	Therm.	Microscopes. I.	II.	III.	IV.
	inches.		h m s	h m s	h m s	h m s
Aug. 1	30.10	42	26 54 33.6	54 38.7	54 42	54 43
2	30.05	39	„ „ 25.0	„ 34.7	„ 42	„ 42
3	30.12	52	„ „ 28.0	„ 35.5	„ 37.7	„ 43.7
Aug. 2	... Mean ...		26 54 28.9	54 36.3	54 40.6	54 42.9
Refract. and Reduct.			−26.0	26.0	26.0	26.0
Superior Culminat.			26 54 2.9	54 10.3	54 14.6	54 16.9
Inferior Culminat...			333 35 42.4	35 49.3	35 51.2	35 50.4
Half Diff. S. P. D.			26 39 10.2	39 10.5	39 11.7	39 13.2

Inferior Culmination.

1827.	Barom.	Therm.	Microscopes. I.	II.	III.	IV.
	inches.		h m s	h m s	h m s	h m s
July 30	29.815	54	333 42 47.8	43 51.2	43 57.3	43 57.7
Aug. 1	30.08	32.5	„ 43 16.3	43 25.0	43 27.0	43 24.0
2	30.07	32.7	„ 43 17.4	43 26.0	43 23.7	43 24.0
Aug. 1	... Mean ...		333 43 7.2	43 14.1	43 16.0	43 15.2
Refract. and Reduct.			−7 24.8	7 24.8	7 24.8	7 24.8
			333 35 42.4	35 49.3	35 51.2	35 50.4

Mean S. P. D. of η Circini, Jan. 1, 1828 . . . . . 26° 39′ 11″.4 by 6 Observ.

β Trianguli. (Ann. Var. — 11″.42.)

Superior Culmination.

1822.	Barom.	Therm.	Microscopes. I.	II.	III.	IV.
	inches.	°	° ′ ″	′ ″	′ ″	′ ″
Aug. 21	29.88	60	65 3 34.7	3 53.0	3 45.5	3 43.0
22	29.88	53	„ „ 35.3	3 56.0	„ 45.5	3 44.5
23	29.88	58	„ „ 35.0	3 46	„ 42.7	4 0.5
24	30.07	58	„ „ 29.5	4 9.4	„ 42.5	3 37.3
27	29.54	54.5	„ „ 30.0	4 15.0	„ 45.5	3 47.5
28	29.67	53	„ „ 31.0	4 3	„ 45.0	3 49.0
Sept. 12	29.95	59	„ „ 37.4	.....	„ 48.7	3 54.5
Aug. 27	... Mean ...		65 3 33.2	4 0.4	3 45.1	3 48.0
Refract. and Reduct.			−1 9.4	1 9.4	1 9.4	1 9.4
Superior Culminat.			65 2 23.8	2 51.0	2 35.7	2 38.6
Inferior Culminat...			10 49 4.1	49 31.3	49 10.7	49 5.8
Half. Diff. S. P. D.			27 6 39.8	6 39.9	6 42.5	6 46.4

Inferior Culmination.

1822.	Barom.	Therm.	Microscopes. I.	II.	III.	IV.
	inches.	°	° ′ ″	′ ″	′ ″	′ ″
Aug. 12	29.90	38	10 56 13.2	56 21.3	56 17.3	56 15.0
22	29.94	45	„ „ 8.0	„ 36.7	„ 12.8	„ 9.6
23	30.00	37.5	„ „ 15.7	„ 51.0	„ 23.4	„ 18.5
24	30.13	41.0	„ „ 13.0	„ 48.7	„ 25.5	„ 16.7
26	29.55	43	„ „ 3.2	„ 31.5	„ 7.0	„ 2.0
Aug. 21	... Mean ...		10 56 10.6	56 37.8	56 17.2	56 12.3
Refract. and Reduct.			−7 6.5	7 6.5	7 6.5	7 6.5
			10 49 4.1	49 31.3	49 10.7	49 5.8

Mean of 4 Microscopes ..... 27° 6′ 42″.2 by 12 Observ.

1827.

1827.	Barom.	Therm.	Microscopes. I.	II.	III.	IV.
	inches.	°	° ′ ″	′ ″	′ ″	′ ″
Aug. 19	29.96	58	27 21 56.3	22 1.2	22 11.3	22 11.0
20	29.95	59	„ „ 56.7	22 0.8	„ 6.8	„ 8.7
21	30.04	51	„ „ 57.7	21 57.5	„ 8.5	„ 9.0
22	.....	.....	„ „ 59.0	21 55.0	„ 4.3	„ 8.0
Aug. 20	.5...Mean...		27 21 57.4	21 58.6	22 10.3	22 9.2
Refract. and Reduct.			− 25.3	25.3	25.3	25.3
Superior Culminat.			27 21 32.1	21 33.3	21 45.0	21 43.9
Inferior Culminat...			333 8 13.3	8 17.7	8 16.7	8 17.3
Half. Diff. S. P. D.			27 06 39.4	06 37.8	6 44.1	6 43.3

1827.

1827.	Barom.	Therm.	Microscopes. I.	II.	III.	IV.
	inches.	°	° ′ ″	′ ″	′ ″	′ ″
Aug. 20	30.05	48	333 15 55.5	16 2	16 0	16 0
28	29.54	50.5	333 15 45.7	15 48	15 48	15 49.3
Aug. 24	... Mean ...		333 15 50.6	15 55	15 54	15 54.6
Refract. and Reduct.			−7 37.3	7 37.3	7 37.3	7 37.3
			333 8 13.3	8 17.7	8 16.7	8 17.3

Mean of 4 Microscopes .....27° 6′ 41″.16 by 6 Observ.

1828.

1828.	Barom.	Therm.	Microscopes. I.	II.	III.	IV.
	inches.	°	° ′ ″	′ ″	′ ″	′ ″
Aug. 11	30.21	48.2	27 20 36	20 40	20 41.3	20 42.3
14	30.00	52	„ „ 36	„ 36.3	„ 42.3	„ 40.0
15	29.72	58	„ „ 35.5	„ 33.2	„ 36.7	„ 39.0
16	29.57	60.5	„ „ 35.0	„ 31	„ 39.3	„ 38.0
20	30.08	63.3	„ „ 28.0	„ 29	„ 38	„ 32
21	30.08	62.5	„ „ 25.5	„ 29	„ 36	„ 31.0
23	29.99	62.3	„ „ 26.5	„ 28.7	„ 34.6	„ 33
24	30.05	61.5	„ „ 27.0	„ 28.3	„ 36.3	„ 30.2
25	29.71	73	„ „ 26	„ 29	„ 34.5	„ 31.5
26	29.79	68.3	„ „ 24.3	„ 26	„ 36.2	„ 30
27	29.93	63	„ „ 27.0	„ 22.1	„ 33.7	„ 37.2
29	30.15	71	„ „ 25	„ 23	„ 27.7	„ 26
30	30.24	64.7	„ „ 22.4	„ 21.3	„ 26.0	„ 25
Aug. 24	... Mean ...		27 20 28.4	20 28	20 33.4	20 32.4
Refract. and Reduct.			−15.8	15.9	15.8	15.9
Superior Culminat.			27 20 12.6	20 12.1	20 17.6	20 16.5
Inferior Culminat...			333 6 55.2	6 41.3	6 54.5	6 50.2
Half Diff. S. P. D.			27 6 38.7	6 45.4	6 41.5	6 43.2

1828.

1828.	Barom.	Therm.	Microscopes. II.	II.	III.	IV.
	inches.	°	° ′ ″	′ ″	′ ″	′ ″
Aug. 7	30.07	51.7	333 15 6.5	15 10.3	15 6.4	15 3.0
8	30.01	41	„ 15 2.0	15 6.0	15 5.0	14 59.0
9	29.80	43.6	„ 14 47.0	14 48.2	14 46.0	14 43.6
13	30.05	40.0	„ 15 0.0	15 2.0	14 58.7	14 57.5
16	29.62	43	„ 14 48.3	14 47.0	14 49.0	14 46.0
19	30.10	33	„ 15 1.5	15 1.2	15 0.4	14 56.4
20	30.09	39	„ 15 1.0	14 59.0	14 57.3	14 56.2
23	30.05	39	„ 14 59.3	14 59.0	14 54.0	14 51.0
25	29.81	44	„ 14 44.5	14 46.0	14 45.0	14 41.0
26	29.87	44	„ 14 44.5	14 46	14 45	14 41.0
27	30.20	36.2	„ 14 57.0	15 1.4	15 0.0	14 51.2
28	30.24	34.5	„ 15 0.0	15 3.0	15 2	14 54.0
Sept. 1	30.23	43	„ 14 54.0	14 49.0	14 50.3	14 42.7
Aug. 19	.5...Mean...		333 14 56.1	14 52.2	14 55.4	14 51.1
Refract. and Reduct.			−8 0.9	8 0.9	8 0.9	8 0.9
			333 6 55.2	6 41.3	6 54.5	6 50.2

Mean of 4 Microscopes.....27° 6′ 42″.2 by 25 Observ.

Mean S. P. D. of β Trianguli, Jan. 1, 1828 . . . . . 27° 6′ 42″.2 by 43 Observ.

α Hydri. (Ann. Var. + 17″.62.)

Superior Culmination.

1823.	Barom.	Therm.	Microscopes. I.	II.	III.	IV.
	inches.	°	° ′ ″	′ ″	′ ″	′ ″
May 25	29.75	54	163 32 35.2	33 29.8	33 31	33 6.4
26	29.56	60	163 32 32.5	33 23	33 23.3	33 1.2
May 25... Mean ...			163 32 33.8	33 26.4	33 27.1	33 3.8
Refract. and Reduct.			+31.1	31.1	31.1	31.1
Superior Culminat.			163 33 4.9	33 57.5	33 58.2	33 34.9
Inferior Culminat...			108 22 20.9	23 19.0	23 4.1	22 37.7
Half Diff. S. P. D.			27 35 24.3	35 24.4	35 24.3	35 24.4

Inferior Culmination.

1823.	Barom.	Therm.	Microscopes. I.	II.	III.	IV.
	inches.	°	° ′ ″	′ ″	′ ″	′ ″
May 26	29.60	57.5	108 31 11.7	32 10.5	31 54.7	31 32.0
27	29.66	56	„ „ 14.7	„ 16.7	32 0.3	„ 31.5
June 3	30.27	50	„ „ 32.5	„ 32.0	32 2.3	„ 46.3
10	30.02	47.5	„ „ 28.4	„ 24.8	32 15.3	„ 45.4
11	30.02	44	„ „ 33.4	„ 32.1	32 19.1	„ 54.5
June 3... Mean ...			108 31 24.1	32 23.2	32 8.3	31 41.9
Refract. and Reduct.			−9 4.2	9 4.2	9 4.2	9 4.2
			108 22 20.9	23 19.0	23 4.1	22 37.7

Mean of 4 Microscopes ..... 27° 35′ 24″.35 by 7 Observ.

1828.	Barom.	Therm.	Microscopes. I.	II.	III.	IV.
	inches.	°	° ′ ″	′ ″	′ ″	′ ″
May 28	29.89	47	27 49 28.1	49 30.4	49 36.2	49 28
29	29.83	47.2	„ „ 34.3	„ 34.0	„ 34	„ 32
31	30.01	46	„ „ 25.7	„ 27	„ 33.3	„ 26.4
June 1	30.05	44.7	„ „ 25.0	„ 28.5	„ 32	„ 22.7
6	29.57	46	„ „ 25	„ 29.2	„ 34	„ 27.5
7	29.44	46.7	„ „ 30.7	„ 28.7	„ 34.2	„ 28
12	29.98	38	„ „ 30.8	„ 32.0	„ 37.2	„ 34
13	30.03	36	„ „ 38.0	„ 33.0	„ 40.5	„ 36.5
16	30.05	41	„ „ 43.0	„ 32.5	„ 38.0	„ 47.0
17	30.19	38	„ „ 31	„ 31.0	„ 33.5	„ 37
June 7.7...Mean...			27 49 31.1	49 30.6	49 35.3	49 31.9
Refract. and Reduct.			−50.8	50.8	50.8	50.8
Superior Culminat.			27 48 40.3	48 39.8	48 44.5	48 41.1
Inferior Culminat...			332 37 45.8	37 50.1	37 54.6	37 41.8
Half Diff. S. P. D.			27 35 27.2	35 24.9	35 24.9	35 29.7

1828.	Barom.	Therm.	Microscopes. I.	II.	III.	IV.
	inches.	°	° ′ ″	′ ″	′ ″	′ ″
May 29	29.84	43.3	332 45 40.0	45 44.3	45 48.8	45 35.5
June 1	29.99	43.3	„ „ 40.0	„ 44.8	„ 49.0	„ 36.0
7	29.47	51	„ „ 24.7	„ 30.6	„ 35.6	„ 21.0
10	29.72	48.5	„ „ 36.7	„ 41.5	„ 45.0	„ 30.8
17	30.03	51.5	„ „ 32.0	„ 34.0	„ 39	„ 30.0
June 7... Mean ...			332 45 34.7	45 39.0	45 43.5	45 30.6
Refract. and Reduct.			−7 48.9	7 48.9	7 48.9	7 48.8
			332 37 45.8	37 50.1	37 54.6	37 41.8

Mean of 4 Microscopes .....27° 35′ 26″.68 by 15 Observ.

Mean S. P. D. of α Hydri, Jan. 1, 1828 . . . . . 27° 35′ 25″.9 by 22 Observ.

1 α Crucis. (Ann. Var. — 19″.987.)

Superior Culmination.

1822.	Barom.	Therm.	Microscopes. I.	II.	III.	IV.
	inches.					
June 5	29.95	51	27 53 3	52 50	53 13.7	53 20
15	30.12	47	27 53 7	52 52	53 26.0	53 4
June 10	... Mean ...		27 53 5.0	52 51.0	53 19.8	53 12.0
Refract. and Reduct.			−1 59.4	1 59.4	1 59.4	1 59.4
Superior Culminat.			27 51 5.6	50 51.6	51 20.4	51 12.6
Inferior Culminat...			332 8 25.6	8 12.0	8 43.0	8 24.7
Half Diff. S. P. D.			27 51 20.0	51 19.8	51 18.7	51 23.9

Inferior Culmination.

1822.	Barom.	Therm.	Microscopes. I.	II.	III.	IV.
	inches.					
June 17	29.93	44	332 15 29.9	15 16.3	15 47.3	15 29.0
Refract. and Reduct.			−7 4.3	7 4.3	7 4.3	7 4.3
			332 8 25.6	8 12.0	8 43.0	8 24.7

Mean of 4 Microscopes .....27° 51′ 20″.6 by 3 Observ.

Superior Culmination.

1822.	Barom.	Therm.	Microscopes. I.	II.	III.	IV.
	inches.					
Nov. 3	30.50	68	65 49 11.2	49 51.2	49 35	49 21.7
6	29.62	75	„ „ 8.0	49 58.7	„ 33.7	„ 21.5
7	29.78	65.5	„ „ 5.6	49 53.0	„ 31.0	„ 17.0
24	30.12	72	„ „ 7.5	50 1.3	„ 38.4	„ 28.5
28	30.08	78	„ „ 5.0	50 5.7	„ 31.8	„ 21.0
29	30.01	78	„ „ 4.0	50 36.4	„ 30.4	„ 21.0
Dec. 12	29.57	84	„ „ 11.0	50 47.6	„ 45	„ 33.7
13	29.52	78.2	„ „ 9.3	50 45.8	„ 40.7	„ 30.1
14	29.60	74.5	„ „ 12.2	.....	„ 40.8	„ 28.5
16	29.68	64	„ „ 6.2	.....	.....	„ 26.0
Nov. 27	... Mean ...		65 49 8.0	50 14.9	49 36.6	49 24.9
Refract. and Reduct.			−2 22.2	2 22.3	2 22.2	2 22.3
Superior Culminat.			65 46 45.8	47 52.6	47 14.4	47 2.6
Inferior Culminat...			10 4 23.3	5 4.5	4 42.9	4 26.6
Half Diff. S. P. D.			27 51 11.2	51 24.0	51 15.7	51 18.0

Inferior Culmination.

1822.	Barom.	Therm.	Microscopes. I.	II.	III.	IV.
	inches.					
Nov. 3	29.72	68.7	10 10 37.3	11 06.9	10 53.3	10 35.9
4	30.14	52.0	„ „ 54.3	„ 42.3	11 17.0	„ 57.7
10	30.07	53.5	„ „ 51.7	„ 38.5	11 10.2	„ 46.7
11	29.91	64.7	„ „ 40.3	„ 16.3	11 1.0	„ 37.5
12	30.14	57.0	„ „ 53.0	„ 26.0	11 2.0	„ 54.5
13	30.00	64.6	„ „ 39.3	.....	10 57.0	„ 44.5
19	30.06	63.8	„ „ 38.6	„ 28.3	11 0.5	„ 39.3
27	30.19	64.5	„ „ 32.3	„ 12.0	10 54.5	„ 44.8
28	30.09	67.8	„ „ 27.7	„ 10.0	10 55.3	„ 44.3
Nov. 14	... Mean ...		10 10 41.6	11 22.9	11 1.2	10 45.04
Refract. and Reduct.			−6 18.3	6 18.4	6 18.3	6 18.4
			10 4 23.3	5 4.5	4 42.9	4 26.6

Mean of 4 Microscopes.....27° 51′ 17″.2 by 19 Observ.

Superior Culmination.

1827.	Barom.	Therm.	Microscopes. I.	II.	III.	IV.
	inches.					
Nov. 18	29.68	70	28 6 46.1	6 45.0	6 56.7	6 57.0
19	29.63	69.5	„ „ 51.7	„ 53.3	7 6.3	7 0.0
25	30.05	71.4	„ „ 49.5	„ 47.7	7 59	7 55.3
30	29.97	71.0	„ „ 51.2	„ 47.0	7 58	7 54
Dec. 1	29.86	67.5	„ „ 46	„ 42.1	7 55.5	7 48.7
3	29.95	69.2	„ „ 47.5	„ 43.0	7 55.8	7 50.7
6	30.04	72.5	„ „ 42.5	„ 43	7 52.3	7 48.0
7	30.00	74.4	„ „ 45.0	„ 44	7 50.0	7 49.5
Nov. 28	... Mean ...		28 6 47.4	6 45.6	6 56.7	6 52.9
Refract. and Reduct.			−46.3	46.3	46.3	46.3
Superior Culminat.			28 6 1.1	5 59.3	6 10.4	6 6.6
Inferior Culminat...			332 23 30.2	23 32.6	23 37.8	23 26.9
Half Diff. S. P. D.			27 51 15.4	51 13.4	51 16.3	51 19.8

Inferior Culmination.

1827.	Barom.	Therm.	Microscopes. I.	II.	III.	IV.
	inches.					
Nov. 18	29.61	62.5	332 31 6.8	31 12.3	31 16.6	31 5.5
26	29.95	64.3	„ „ 18.7	„ 21.4	„ 28.0	„ 14.0
Dec. 6	30.01	67.0	„ „ 8.0	„ 7.0	„ 11.9	„ 3.8
Nov. 27	... Mean ...		332 31 11.2	31 13.6	31 18.8	31 7.8
Refract. and Reduct.			−7 41.0	7 41.0	7 41.0	7 40.9
			332 23 30.2	23 32.6	23 37.8	23 26.9

Mean Inside Temperature 70°.3.

Mean of 4 Microscopes.....27° 51′ 16″.24 by 11 Observ.

Mean S. P. D. of 1 α Crucis, Jan. 1, 1828 . . . . . 27° 51′ 17″.1 by 33 Observ.

α Tucanæ. (Ann. Var. + 17″.616.)

Superior Culmination.

1822.	Barom.	Therm.	Microscopes. I.	II.	III.	IV.
	inches.	°	° ′ ″	′ ″	′ ″	′ ″
May 21	29.93	48	28 52 12.5	51 45	52 21.7	52 18.5
26	29.84	46	„ 52 3.0	51 40	„ 16.3	„ 11.5
28	30.04	44	„ 52 6.0	51 41.2	„ 24	„ 14.0
29	29.88	48	„ 52 0.5	51 31.6	„ 19	„ 11.0
30	29.63	51	„ 52 0.5	51 43.2	„ 20	„ 13.0
31	29.57	58	„ 52 1.3	52 2	„ 23.5	„ 16.0
June 3	29.71	48	„ 51 59.5	51 59.3	„ 14.4	„ 4.8
6	30.03	46	„ 52 13.5	.....	.....	„ 17.9
15	30.12	34	„ 52 12.0	.....	„ 29.3	„ 11.4
May 31	... Mean ...		28 52 5.4	51 46.0	52 21.0	52 13.1
Refract. and Reduct.			+51.7	51.7	51.7	51.7
Superior Culminat.			28 52 57.1	52 37.7	53 12.7	53 4.8
Inferior Culminat...			331 6 27.5	6 15.1	6 40.7	6 24.3
Half Diff. S. P. D.			28 53 14.8	53 11.3	53 16.0	53 20.2

Inferior Culmination.

1822.	Barom.	Therm.	Microscopes. I.	II.	III.	IV.
	inches.	°	° ′ ″	′ ″	′ ″	′ ″
May 26	29.62	60	331 17 18	16 48.5	17 36.4	17 5.0
June 2	29.85	57	„ „ 26.0	.....	.....	„ 22.5
3	29.76	56	„ „ 17.0	17 10	„ 27.0	„ 5.3
4	29.90	57	„ „ 28.7	17 34.0	„ 45.7	„ 26.8
June 1	... Mean ...		331 17 23.2	17 10.8	17 36.4	17 19.9
Refract. and Reduct.			−10 55.7	10 55.7	10 55.7	10 55.6
			331 6 27.5	6 15.1	6 40.7	6 24.3

Mean of 4 Microscopes .....28° 53′ 16″.0 by 13 Observ.

1827.	Barom.	Therm.	Microscopes. I.	II.	III.	IV.
	inches.	°	° ′ ″	′ ″	′ ″	′ ″
May 4	29.918	41.5	29 8 44	8 51.9	8 49.2	8 41.5
6	30.164	48	„ „ 48.5	„ 51.8	8 48	8 44
8	30.145	46	„ „ 43.6	„ 50.8	8 56.1	9 1.3
19	30.02	41	„ „ 44.8	„ 50.7	8 54.4	9 3.7
22	30.20	48	„ „ 43.5	„ 48	8 51.1	9 6.0
23	30.14	50	„ „ 42	„ 47.3	8 56	9 5.1
24	30.18	49	„ „ 42.3	„ 53.3	8 57.4	9 5.5
25	30.12	45.5	„ „ 45.0	„ 51.2	8 54.1	9 5.4
31	30.33	45	„ „ 48.5	„ 54.0	9 0	9 7.8
May 19	... Mean ...		29 8 44.7	8 51.0	8 54.0	9 0.0
Refract. and Reduct.			−41.5	41.5	41.5	41.5
Superior Culminat.			29 8 03.2	8 9.5	8 12.5	8 18.5
Inferior Culminat...			331 21 40.5	21 39.4	21 44.3	21 38.1
Half Diff. S. P. D.			28 53 11.3	53 15.1	53 14.1	53 20.2

1827.	Barom.	Therm.	Microscopes. I.	II.	III.	IV.
	inches.	°	° ′ ″	′ ″	′ ″	′ ″
May 4	29.91	51	331 31 7.0	31 12.0	31 11.0	30 50.0
5	29.98	54	„ 31 8.3	31 6.4	31 8.0	30 56.7
6	30.09	60	„ 31 9.3	31 0.0	31 1.1	30 53.3
7	30.07	63	„ 31 3.0	31 3.0	31 7.0	30 53.0
21	30.12	55	„ 31 1.6	31 1.0	31 13.0	31 13.0
23	30.15	60	„ 30 55.0	30 53.7	30 57.0	31 0.5
24	30.12	63	„ 30 55.8	30 57.3	31 3.5	31 5.0
25	30.07	63	„ 30 56.0	30 54.0	31 6.0	31 5.0
May 14	4... Mean...		331 31 2.0	31 0.9	31 5.8	30 59.6
Refract. and Reduct.			−9 21.5	9 21.5	9 21.5	9 21.5
			331 21 40.5	21 39.4	21 44.3	21 38.1

Mean of 4 Microscopes.....28° 53′ 15″.17 by 17 Observ.

1828.	Barom.	Therm.	Microscopes. I.	II.	III.	IV.
	inches.	°	° ′ ″	′ ″	′ ″	′ ″
April 4	30.05	59	29 7 36.4	7 34.5	7 45.3	7 41.5
7	30.05	66	„ „ 37.0	„ 33.4	„ 47.3	„ 41.0
9	29.77	63.7	„ „ 28.0	„ 28.5	„ 42.3	„ 36.3
10	29.85	61.5	„ „ 28.7	„ 33	„ 43.5	„ 38.8
12	.....	.....	„ „ 27.0	„ 25.7	„ 38.6	„ 31.7
April 8	... Mean ...		29 7 31.4	7 31.0	7 43.4	7 37.9
Refract. and Reduct.			−48.2	48.2	48.3	48.2
Superior Culminat.			29 6 43.2	6 42.8	6 55.1	6 49.7
Inferior Culminat...			331 20 6.1	20 7.0	20 9.9	20 6.2
Half Diff. S. P. D.			28 53 18.55	53 17.9	53 22.6	53 21.7

1828.	Barom.	Therm.	Microscopes. I.	II.	III.	IV.
	inches.	°	° ′ ″	′ ″	′ ″	′ ″
April 1	29.54	65.4	331 29 1.4	29 13.3	29 18.0	29 14.1
5	30.12	53.5	„ „ 41.7	„ 43.0	„ 45	„ 41
10	29.72	65.5	„ „ 4	„ 6.0	„ 8	„ 4
April 5	... Mean ...		331 29 19.9	29 20.8	29 23.7	29 19.7
Refract. and Reduct.			−9 13.8	9 13.8	9 13.8	9 13.7
			331 20 6.1	20 7.0	20 9.9	20 6.2

Mean of 4 Microscopes.....28° 53′ 20″.19 by 8 Observ.

α Tucanæ. (Ann. Var. + 17″.616.)—(Continued.)

Superior Culmination.

1828.	Barom.	Therm.	Microscopes. I.	II.	III.	IV.
	inches.	°	° ′ ″	′ ″	′ ″	′ ″
Apr. 16	30.15	58.5	29 7 33	7 51	7 45.7	7 54.5
19	29.91	55	„ „ 31.7	„ 30.3	„ 44	„ 34.7
21	29.92	56	„ „ 33.0	„ 30.7	„ 46	„ 34.3
26	29.96	51	„ „ 40.0	„ 39.3	„ 43.2	„ 41.0
29	30.16	42.5	„ „ 27.0	„ 28.4	„ 42.5	„ 32.3
May 7	29.85	45.5	„ „ 39.4	„ 40.5	„ 42.9	„ 40.8
Apr. 25	... Mean ...		29 7 33.8	7 33.4	7 44.0	7 36.3
Refract. and Reduct.				−53.3	53.4	53.3	53.4
Superior Culminat.			29 6 40.5	6 40.0	6 50.7	6 42.9
Inferior Culminat...			331 20 0.6	20 2.2	20 7.7	19 59.7
Half Diff. S. P. D.			28 53 20.0	53 19.9	53 21.5	53 21.6

Inferior Culmination.

1828.	Barom.	Therm.	Microscopes. I.	II.	III.	IV.
	inches.	°	° ′ ″	′ ″	′ ″	′ ″
Apr. 20	29.85	60	331 29 19	29 20.9	29 24	29 20
18	30.06	54.3	„ „ 25.2	„ 27	„ 31.4	„ 24
21	29.83	59.7	„ „ 5.0	„ 7.7	„ 9.6	„ 3.3
30	30.08	59.1	„ „ 19.7	„ 16.3	„ 21.0	„ 15.0
May 1	30.25	55	„ „ 20.6	„ 25.3	„ 29.0	„ 22.2
8	29.71	56.5	„ „ 11.7	„ 14.0	„ 19.3	„ 11.3
Apr. 26	... Mean ...		331 29 16.9	29 18.5	29 24.0	29 16.0
Refract. and Reduct.			−9 16.3	9 16.3	9 16.3	9 16.3
			331 20 0.6	20 2.2	20 7.7	19 59.7
Mean of 4 Microscopes .....28° 53′ 20″.75 by 12 Observ.						

1828.	Barom.	Therm.	Microscopes. I.	II.	III.	IV.
	inches.	°	° ′ ″	′ ″	′ ″	′ ″
May 12	29.80	72	29 7 26	7 31.2	7 43.5	7 41.3
3	29.88	70	„ „ 25	„ 32.0	„ 43.3	„ 34.5
14	29.92	50.4	„ „ 21.3	„ 29.5	„ 39.1	„ 30.4
15	30.03	37.5	„ „ 23.0	„ 29.3	„ 37.5	„ 30.0
17	30.07	34.5	„ „ 33.0	„ 37.0	„ 39.4	„ 34.8
18	30.22	34.6	„ „ 23.7	„ 27.7	„ 38.3	„ 31.2
19	30.40	36.0	„ „ 25.7	„ 29.0	„ 31.7	„ 31.0
23	30.27	49.0	„ „ 20.0	„ 26.0	„ 28.0	„ 29.0
May 16	... Mean ...		29 7 24.7	7 30.2	7 37.6	7 32.8
Refract. and Reduct.				−58.4	58.4	58.4	58.3
Superior Culminat.			29 6 26.3	6 31.8	6 39.2	6 34.5
Inferior Culminat...			331 19 52.4	19 52.6	19 56.2	19 51.5
Half Diff. S. P. D.			28 53 16.9	53 19.6	53 21.5	53 21.5

1828.	Barom.	Therm.	Microscopes. I.	II.	III.	IV.
	inches.	°	° ′ ″	′ ″	′ ″	′ ″
May 12	29.69	74.6	331 28 40.1	28 39.4	28 44.2	28 40.6
13	29.78	65.7	„ 28 56.0	28 55.8	28 58	28 55.4
15	29.99	58.2	„ 29 4.0	29 6.5	29 9.0	29 3.2
16	30.05	51.5	„ 29 11.8	29 11.5	29 14.4	29 11.7
18	30.11	50	„ 29 17.4	29 16.3	29 22.2	29 14.8
19	30.30	50.5	„ 29 18.4	29 18.0	29 19.1	29 15.0
20	30.37	56	„ 29 9.0	29 9.3	29 14.3	29 8.3
25	30.14	59	„ 29 2.0	29 2.0	29 3.5	29 1.4
27	29.95	62.8	„ 28 50.5	28 52.2	28 58.0	28 53.8
May 18	... Mean ...		331 29 3.2	29 3.4	29 7.0	29 2.4
Refract. and Reduct.			−9 10.8	9 10.8	9 10.8	9 10.9
			331 19 52.4	19 52.6	19 56.2	19 51.5
Mean of 4 Microscopes.....28° 53′ 19″.89 by 17 Observ.						

1828.	Barom.	Therm.	Microscopes. I.	II.	III.	IV.
	inches.	°	° ′ ″	′ ″	′ ″	′ ″
May 27	29.93	40.4	29 7 26.7	7 35.8	7 44	7 34.6
29	29.81	34.5	„ „ 26.0	„ 32.0	„ 36	„ 29.1
31	29.93	35.0	„ „ 19.0	„ 29.0	„ 31.7	„ 28.0
June 1	30.05	35	„ „ 21.7	„ 26.0	„ 36	„ 26
6	29.57	40.4	„ „ 20.0	„ 28.0	„ 38.7	„ 29.8
May 31	... Mean ...		29 7 22.7	7 30.1	7 37.3	7 29.5
Refract. and Reduct.			−1 0.4	1 0.5	1 0.4	1 0.5
Superior Culminat.			29 6 22.3	6 29.6	6 36.9	6 29.0
Inferior Culminat...			331 19 46.8	19 47.7	19 52.7	19 46.7
Half Diff. S. P. D.			28 53 17.7	53 21.0	53 22.1	53 21.6

1828.	Barom.	Therm.	Microscopes. I.	II.	III.	IV.
	inches.	°	° ′ ″	′ ″	′ ″	′ ″
May 28	29.87	55	331 29 3.8	29 6	29 11.1	29 6.7
29	29.80	53	„ 28 55.0	28 57	„ 0.0	28 56.0
31	29.82	54.7	„ 29 1.0	29 1.2	„ 7.3	28 59.3
June 2	29.99	53	„ 29 0.0	28 58.4	„ 4.0	28 56.0
May 30	... Mean ...		331 28 59.7	29 0.7	29 5.6	28 59.7
Refract. and Reduct.			−9 12.9	9 13.0	9 12.9	9 13.0
			331 19 46.8	19 47.7	19 52.7	19 46.7
Mean of 4 Microscopes.....28° 53′ 20″.61 by 9 Observ.						

Mean S. P. D. of α Tucanæ, Jan. 1, 1828 . . . . . 28° 53′ 18″.46 by 76 Observ.

1 α Centauri. (Ann. Var. — 15″.971.)

Superior Culmination.

1827.	Barom.	Therm.	Microscopes. I.	II.	III.	IV.
	inches.	°	° ′ ″	′ ″	′ ″	′ ″
Dec. 12	29.58	87	30 7 52.5	7 51.4	8 1.4	8 8
15	30.25	77	„ 7 53.3	„ 53.8	„ 9.0	„ 3
16	30.23	78.7	„ 8 0.0	„ 53.7	„ 7.7	„ 7
Dec. 14	... Mean ...		30 7 55.3	7 53.0	8 6.0	8 6.0
Refract. and Reduct.			−42.7	42.6	42.6	42.6
Superior Culminat.			30 7 13.6	7 10.4	7 23.4	7 23.4
Inferior Culminat...			330 22 0.9	22 1.3	22 4.5	22 1.8
Half Diff. S. P. D.			29 52 35.9	52 34.5	52 39.4	52 40.8

Inferior Culmination.

1827.	Barom.	Therm.	Microscopes. I.	II.	III.	IV.
	inches.	°	° ′ ″	′ ″	′ ″	′ ″
Dec. 16	30.224	61.7	330 32 59	32 59.4	33 2.6	33 0.0
Refract. and Reduct.			−10 58.1	10 58.1	10 58.1	10 58.2
			330 22 0.9	22 1.3	22 4.5	22 1.8

Mean S. P. D. of 1 α Centauri, Jan. 1, 1828 . . . . . 29° 52′ 37″.66 by 4 Observ.

2 α Centauri. (Ann. Var. — 15″.970.)

Superior Culmination.

1822.	Barom.	Therm.	Microscopes. I.	II.	III.	IV.
	inches.	°	° ′ ″	′ ″	′ ″	′ ″
Nov. 28	30.06	85	67 50 22.3	51 10.9	50 43.5	50 27.3
29	30.00	85	„ „ 23.1	50 52.1	„ 44.2	„ 29.1
Dec. 10	29.78	82	„ „ 23.7	50 53.8	„ 48.7	„ 33.5
13	29.48	84.5	„ „ 25.0	50 53.4	„ 49.3	„ 31.4
14	29.60	81	„ „ 21.4	50 50.5	„ 46.2	„ 32.4
24	30.00	83	„ „ 22.4	51 7.0	„ 49.7	„ 32.1
1823.						
Jan. 19	29.87	50	„ „ 16.5	51 0.5	„ 45.0	„ 30.3
20	30.02	64	„ „ 24.0	51 17.0	„ 56.9	„ 40.0
Dec. 20	... Mean ...		67 50 22.3	51 0.7	50 48.0	50 32.0
Refract. and Reduct.			−1 53.4	1 52.4	1 52.4	1 52.3
Superior Culminat.			67 48 29.9	49 8.3	48 55.6	48 39.7
Inferior Culminat...			8 2 52.1	3 24.2	3 10.1	2 48.2
Half Diff. S. P. D.			29 52 48.9	52 52.0	52 52.7	52 55.7

Inferior Culmination.

1822.	Barom.	Therm.	Microscopes. I.	II.	III.	IV.
	inches.	°	° ′ ″	′ ″	′ ″	′ ″
Dec. 11	29.75	70.3	8 12 25.0	12 50	12 36.1	12 18.3
15	29.62	68.0	„ „ 25	12 53.5	„ 53.1	„ 23.5
21	30.02	59.8	„ „ 34.8	13 8.6	„ 45.6	„ 23.9
24	29.92	76	„ „ 10.7	.....	.....	„ 6.6
27	29.95	73.5	„ „ 13.0	12 43.3	„ 24.2	„ 16.5
Dec. 19	... Mean ...		8 12 21.7	12 53.8	12 39.75	12 17.8
Refract. and Reduct.			−9 29.6	9 29.6	9 29.6	9 29.6
			8 2 52.1	3 24.2	3 10.1	2 48.2

Mean of 4 Microscopes.....29° 52′ 52″.34 by 13 Observ.

2 α Centauri. (Ann. Var. — 15″.970.)—(Continued.)

Superior Culmination.

1826.	Barom.	Therm.	Microscopes. I.	II.	III.	IV.
	inches.	°	° ′ ″	′ ″	′ ″	′ ″
July 11	29.74	43	30 34 17.0	34 9.6	34 16	34 18
19	29.90	42	„ „ 17.0	„ 10.0	„ 21.0	„ 18
13	30.06	46.5	„ „ 17.0	„ 8.0		
19	30.10	46	„ „ 12.0	„ 5.7	„ 14.8	„ 16.0
25	29.84	46	„ „ 17.0	„ 13.5	„ 18.0	„ 20.5
29	29.27	48	„ „ 13.0	„ 10.0	„ 15.0	„ 16.8
31	30.38	50	„ „ 10.7	„ 7.0	„ 12.6	„ 16.8
Aug. 1	30.21	52	„ „ 18.0	„ 10.0	„ 17.3	„ 20.5
7	30.14	51	„ „ 14.3	„ 10.0	„ 17.5	„ 17.0
July 23	... Mean ...		30 34 15.1	34 9.3	34 16.5	34 18.0
Refract. and Reduct.			−34.9	35.0	34.9	35.0
Superior Culminat.			30 33 40.2	33 34.3	33 41.6	33 43.0
Inferior Culminat...			330 47 53.8	47 47.6	47 50.4	47 54.5
Half Diff. S. P. D.			29 52 53.2	52 53.3	52 55.6	52 54.3

Inferior Culmination.

1826.	Barom.	Therm.	Microscopes. I.	II.	III.	IV.
	inches.	°	° ′ ″	′ ″	′ ″	′ ″
July 16	30.114	25	331 0 9.5	0 4.3	0 7.5	0 8
26	29.55	39	330 59 26.0	59 21.0	59 22.0	59 29
30	30.36	32	331 0 1.0	59 53	59 57.0	0 2.0
July 24	... Mean ...		330 59 59.2	59 46.1	59 48.8	59 53.0
Refract. and Reduct.			−11 58.4	11 58.5	11 58.4	11 58.5
			330 47 53.8	47 47.6	47 50.4	47 54.5

Mean of 4 Microscopes.....29° 52′ 54″.1 by 12 Observ.

1826.	Barom.	Therm.	Microscopes. I.	II.	III.	IV.
	inches.	°	° ′ ″	′ ″	′ ″	′ ″
Aug. 11	29.85	57	30 34 17.5	34 10	34 15.1	34 15.7
12	30.06	57.5	„ „ 17.0	„ 9.4	„ 15.2	„ 20.5
28	29.86	66.0	„ „ 15.0	„ 6.5	„ 12.7	„ 17.0
Sept. 4	29.60	72.5	„ „ 15.0	„ 7.0	„ 11.0	„ 16.0
14	29.52	75.7	„ „ 12.0	„ 8.0	„ 10.7	„ 16.3
Aug. 26	... Mean ...		30 34 15.3	34 8.2	34 13.0	34 17.1
Refract. and Reduct.			−35.4	35.4	35.4	35.4
Superior Culminat.			30 33 39.9	33 32.8	33 37.6	33 41.7
Inferior Culminat...			330 47 51.3	47 44.2	47 46.8	47 50.3
Half Diff. S. P. D.			29 52 54.3	52 54.3	52 55.4	52 55.7

1826.	Barom.	Therm.	Microscopes. I.	II.	III.	IV.
	inches.	°	° ′ ″	′ ″	′ ″	′ ″
Aug. 12	30.05	42	330 59 42	59 32	59 56	59 40.3
Sept. 5	29.92	43	330 59 19.2	59 15.0	59 16.2	59 19.0
Aug. 24	... Mean ...		330 59 30.6	59 23.5	59 26.1	59 29.6
Refract. and Reduct.			−11 39.3	11 39.3	11 39.3	11 39.3
			330 47 51.3	47 44.2	47 46.8	47 50.3

Mean of 4 Microscopes.....29° 52′ 54″.92 by 7 Observ.

2 α Centauri. (Ann. Var. — 15″.970.)—(Continued.)

Superior Culmination.

1827.	Barom.	Therm.	Microscopes. I.	II.	III.	IV.
	inches.		° ′ ″	′ ″	′ ″	′ ″
Nov. 18	29.64	52	30 6 21.6	6 16.9	6 30	6 28.2
21	29.81	66.5	„ „ 17	„ 17.5	„ 30	„ 26.2
25	30.02	77	„ „ 18	„ 19.5	„ 31	„ 28.0
Dec. 1	29.85	81.3	„ „ 19	„ 12.3	„ 27.2	„ 21.5
8	29.99	86.3	„ „ 19	„ 11.5	„ 26.0	„ 23
9	29.79	97	„ „ 15.5	„ 13.7	„ 27.5	„ 21.0
13	29.80	78.5	„ „ 15.5	„ 9.6	„ 21.5	„ 24.6
17	30.08	82.5	„ „ 17.0	„ 12.1	„ 24.8	„ 17.5
18	29.86	91	„ „ 10	„ 14.8	„ 27.5	„ 16.6
21	29.81	79.2	„ „ 10.5	„ 8.5	„ 23.2	„ 19.1
24	29.88	70	„ „ 6.0	„ 3.2	„ 11.4	„ 11.0
Dec. 8	... Mean ...		30 6 15.4	6 12.7	6 25.5	6 21.5
	Refract. and Reduct.		−41.6	41.6	41.6	41.7
	Superior Culminat.		30 5 33.8	5 31.1	5 43.9	5 39.8
	Inferior Culminat ...		330 19 38.2	19 40.7	19 39.9	19 39.3
	Half Diff. S. P. D.		29 52 57.8	52 55.7	53 2.0	53 0.2

Inferior Culmination.

1827.	Barom.	Therm.	Microscopes. I.	II.	III.	IV.
	inches.		° ′ ″	′ ″	′ ″	′ ″
Nov. 21	29.75	58.7	330 32 44.8	32 48	32 46.3	32 46
25	30.115	52	„ 33 6	33 9	33 7.7	33 10.5
29	29.745	61.5	„ 32 33	32 43.3	32 35.2	32 40
Dec. 5	29.96	65	„ 32 32.1	32 30.6	32 35.5	32 32.3
17	30.154	65.7	„ 32 34	32 34.3	32 34.7	32 31.0
18	29.932	72	„ 32 12.0	32 10.3	32 18.1	32 10.0
20	29.65	77.0	„ 31 50	31 56.0	31 55.0	31 50
22	29.83	69	„ 32 8.4	32 8.5	32 11.1	32 9.0
Dec. 8	... Mean ...		330 32 27.5	32 30.0	32 29.2	32 28.6
	Refract. and Reduct.		−10 49.3	10 49.3	10 49.3	30 49.3
			330 21 38.2	21 40.7	21 39.9	21 39.3

Mean Inside Temperature 69°.3.

Mean of 4 Microscopes.....29° 52′ 58″.92 by 19 Observ.

Superior Culmination.

1828.	Barom.	Therm.	Microscopes. I.	II.	III.	IV.
	inches.		° ′ ″	′ ″	′ ″	′ ″
Aug. 15	29.72	58	30 6 38.7	6 36	6 47.5	6 39.5
16	29.57	62.5	„ „ 39.0	„ 35	„ 47.0	„ 45.5
24	30.05	64.2	„ „ 40.0	„ 32.7	„ 46.0	„ 38.7
25	29.65	73	„ „ 34.0	„ 33.1	„ 38.3	„ 39.4
29	30.15	71	„ „ 39.0	„ 30	„ 42.2	„ 40.6
30	30.22	70	„ „ 34.5	„ 31.2	„ 45.0	„ 41.0
Sept. 5	29.91	63.5	„ „ 34.3	„ 30.0	„ 40.0	„ 41.2
Aug. 25	... Mean ...		30 6 36.5	6 32.4	6 43.7	6 40.8
	Refract. and Reduct.		−8.9	8.9	8.9	8.9
	Superior Culminat.		30 6 27.6	6 23.5	6 34.8	6 31.9
	Inferior Culminat...		330 20 27.0	20 24.6	20 26.7	20 23.1
	Half Diff. S. P. D.		29 53 0.2	52 59.4	53 4.1	53 4.4

Inferior Culmination.

1828.	Barom.	Therm.	Microscopes. I.	II.	III.	IV.
	inches.		° ′ ″	′ ″	′ ″	′ ″
Aug. 15	29.65	47	330 32 27.4	32 27	32 27.2	32 23.6
16	29.65	42.5	„ 32 28.0	32 24	32 26.1	32 22.0
17	29.31	61.5	„ 31 44	31 36	31 39.6	31 39.7
23	30.05	37.3	„ 32 40	32 41.6	32 39.5	32 38.7
26	29.86	47	„ 32 20.8	32 20.8	32 21.0	32 17.3
27	30.20	35	„ 32 45	32 43.2	32 45.7	32 44.5
28	29.25	37	„ 32 47.3	32 46.0	32 48.0	32 42.7
Sept. 1	30.20	42.7	„ 32 35.0	32 32.3	32 40	32 33.3
8	29.92	42	„ 32 28.2	32 22.1	32 28	32 20.0
Aug. 25	... Mean ...		330 32 28.4	32 26	32 28.1	32 24.6
	Refract. and Reduct.		−12 1.4	12 1.4	12 1.4	12 1.5
			330 20 27.0	20 24.6	20 26.7	20 23.1

Mean of 4 Microscopes .....29° 53′ 2″.05 by 16 Observ.

2 α Centauri. (Ann. Var. — 15″.970.)—(Continued.)

Superior Culmination.

1828.	Barom.	Therm.	Microscopes. I.	II.	III.	IV.
	inches.	°	h m s	h m s	h m s	h m s
Oct. 7	30.16	64.5	7 35.4	7 38	7 43.3	7 41.0
19	29.90	73	„ „ 32.5	„ 34.7	„ 43.2	„ 37.0
29	29.76	86	„ „ 35.1	„ 40.0	„ 43.7	„ 44.2
30	30.04	73	„ „ 29.0	„ 39.5	„ 51.0	„ 44.2
Nov. 3	29.94	75	„ „ 37.1	„ 36.5	„ 48.5	„ 39.3
7	29.84	77	„ „ 35.7	„ 37.8	„ 41.0	„ 43.2
9	29.79	58	„ „ 34.0	„ 39.0	„ 45	„ 40
11	29.54	80	„ „ 37.5	„ 40.8	„ 47.0	„ 45
12	29.57	76.7	„ „ 40.0	„ 40.0	„ 42.0	„ 42.3
14	29.52	80	„ „ 37.0	„ 42.6	„ 45.8	„ 45.5
16	29.50	77.5	„ „ 40.3	„ 38.0	„ 44.0	„ 45.0
23	29.77	70.5	„ „ 38.6	„ 40.3	„ 51.0	„ 46.5
25	29.79	82	„ „ 36.7	„ 33.0	„ 40.0	„ 39.3
26	29.93	80	„ „ 33.5	„ 37.7	„ 43	„ 38.0
27	29.98	80.2	„ „ 30.8	„ 37.5	„ 42	„ 39.0
Dec. 5	30.04	82	„ „ 40.8	„ 39.5	„ 51	„ 43.0
14	29.94	82.5	„ „ 40.7	„ 43	„ 51	„ 49.7
15	29.83	95	„ „ 37.0	„ 43.7	„ 45	„ 48.0
23	29.69	90.5	„ „ 44.0	„ 44.5	„ 52.0	„ 50.0
26	30.11	72.5	„ „ 42	„ 46	„ 43	„ 45
Nov. 18	... Mean ...		30 7 36.9	7 39.6	7 45.6	7 43.3
Refract. and Reduct.			−26.14	26.2	26.1	26.2
Superior Culminat.			30 7 10.8	7 13.4	7 19.5	7 17.1
Inferior Culminat...			330 21 23.0	21 23.3	21 23.5	21 19.7
Half Diff. S. P. D.			29 52 53.9	52 55.1	52 58.0	52 58.7

Inferior Culmination.

1828.	Barom.	Therm.	Microscopes. I.	II.	III.	IV.
	inches.	°	h m s	h m s	h m s	h m s
Nov. 4	29.90	58.5	330 32 46.0	32 47.0	32 45.3	32 47
17	29.50	60	„ 32 35.0	32 32.0	32 33.5	32 25.0
23	29.49	71	„ 32 2.0	32 0.0	32 5.0	32 1.0
Dec. 5	30.07	66	„ 32 32.0	32 32.0	32 28.0	32 25.0
13	30.08	65	„ 32 27.0	32 27.7	32 31.0	32 23.0
14	30.02	65	„ 32 22.0	32 27.0	32 25.3	32 20.0
15	29.80	79	„ 31 46.2	31 47.0	31 47.0	31 47.0
Nov. 30	... Mean ...		330 32 21.5	32 21.8	32 22.1	32 18.3
Refract. and Reduct.			−10 58.5	10 58.5	10 58.6	10 58.6
			330 21 23.0	21 23.3	21 23.5	21 19.7

Mean Inside Temperature 73°.

Mean of 4 Microscopes ..... 29° 52′ 56″.41 by 27 Observ.

Mean S. P. D. of 2 α Centauri, Jan. 1, 1828 . . . . . 29° 52′ 57″.205 by 94 Observ.

β Centauri. (Ann. Var. — 17″.69.)

Superior Culmination.

1822.	Barom.	Therm.	Microscopes. I.	II.	III.	IV.
	inches.	°	h m s	h m s	h m s	h m s
Nov. 24	30.10	81.1	68 25 20.2	26 8.2	25 42	25 24.5
Dec. 15	29.57	79	„ „ 16.2	25 51.8	„ 46.2	„ 31
17	29.67	77	„ „ 19.1	26 8.7	„ 46.9	„ 34.4
19	29.85	74	„ „ 16.9	26 3.7	„ 43.4	„ 32.0
20	29.94	68.2	„ „ 13.5	26 1.2	„ 42.1	„ 31.7
21	30.04	73	„ „ 15	26 5.4	„ 44.1	„ 31.1
22	30.07	74.5	„ „ 18.5	26 4.3	„ 47.9	„ 33.7
23	30.00	78	„ „ 17.3	26 3.8	„ 43.7	„ 29.2
Dec. 16	... Mean ...		68 25 17.1	26 3.4	25 44.5	25 31.0
Refract. and Reduct.			−2 2.9	2 3.0	2 2.9	2 3.0
Superior Culminat.			68 23 14.2	24 0.4	23 41.6	23 28.0
Inferior Culminat...			7 28 21.1	28 52.6	28 33.9	28 22.8
Half Diff. S. P. D.			30 27 26.5	27 33.9	27 33.9	27 32.6

Inferior Culmination.

1822.	Barom.	Therm.	Microscopes. I.	II.	III.	IV.
	inches.	°	h m s			h m s
Dec. 13	29.54	67	7 38 44	.....	.....	38 39.8
19	29.89	61	„ „ 46.8	39 19	38 58.7	„ 43.2
21	30.00	60.5	„ „ 43.7	39 17	38 54.2	„ 45.3
22	30.03	62.5	„ „ 55.7	39 26	39 5.6	„ 54.5
23	29.96	69	„ „ 24.7	38 56	38 44.9	„ 40.0
Dec. 20	... Mean ...		7 38 43.0	39 14.5	38 55.8	38 44.6
Refract. and Reduct.			−10 21.9	10 21.9	10 21.9	10 21.8
			7 28 21.1	28 52.6	28 33.9	28 22.8

Mean of 4 Microscopes ..... 30° 27′ 31″.72 by 13 Observ.

β Centauri. (Ann. Var. — 17″.69.)—(Continued.)

Superior Culmination.

1827.	Barom.	Therm.	Microscopes. I.	II.	III.	IV.
	inches.		° ′ ″	′ ″	′ ″	′ ″
Nov. 19	29.62	65.3	30 43 4	43 9	43 18	43 13
25	30.02	75.7	„ 43 3.7	43 6	„ 15.7	43 9.7
Dec. 1	29.86	81.9	„ 43 5.0	43 1.8	„ 10.0	43 14.0
7	29.99	83.7	„ 43 1.6	43 0.0	„ 10.8	43 5.9
8	29.80	93.8	„ 42 56.0	43 0.8	„ 10.3	43 8.1
12	29.60	83.3	„ 42 57.0	42 58.4	„ 8.3	43 2
16	30.23	76.5	„ 43 0.0	43 1.1	„ 10.4	43 18
18	29.86	91	„ 42 57.7	42 59.5	„ 8.3	42 59.5
21	29.81	73.5	„ 42 53.0	42 58.0	„ 1.5	43 9.5
27	30.12	70.6	„ 42 51.5	42 55.5	„ 7.4	43 5.0
28	30.08	72.5	„ 42 53.0	42 57.0	„ 10.0	43 8.1
Dec. 11	... Mean ...		30 42 58.9	43 0.6	43 10.0	43 8.1
Refract. and Reduct.			−40.5	40.6	40.5	40.6
Superior Culminat.			30 42 18.4	42 20.0	42 29.5	42 27.5
Inferior Culminat...			329 46 53.8	47 2.8	46 56.0	46 53.7
Half Diff. S. P. D.			30 27 42.3	27 38.6	27 46.7	27 46.9

Inferior Culmination.

1827.	Barom.	Therm.	Microscopes. I.	II.	III.	IV.
	inches.		° ′ ″	′ ″	′ ″	′ ″
Dec. 5	29.95	65.3	329 58 59.6	59 2	59 0.5	59 0.5
6	30.03	66.2	„ 59 2.7	59 5.9	59 2.3	59 3.4
15	30.20	62	„ 59 5.0	59 13.0	59 10.7	59 5.5
16	30.21	66.5	„ 58 58.5	59 4.2	59 5.0	58 58.0
18	29.93	72.5	„ 58 45.0	58 48.7	58 46.0	58 43.0
Dec. 10	... Mean ...		329 58 58.2	59 7.2	59 0.4	58 58.1
Refract. and Reduct.			−12 4.4	12 4.4	12 4.4	12 4.4
			329 46 53.8	47 2.8	46 56.0	46 53.7

Mean Inside Temperature 71°.7.

Mean of 4 Microscopes.....30° 27′ 43″.64 by 16 Observ.

Mean S. P. D. of β Centauri, Jan. 1, 1828 . . . . . 30° 27′ 37″.7 by 29 Observ.

η Argus. (Ann. Var. — 18″.76.)

Superior Culmination.

1822.	Barom.	Therm.	Microscopes. I.	II.	III.	IV.
	inches.		° ′ ″	′ ″	′ ″	′ ″
May 21	29.96	53	31 14 37.4	14 27.5	14 57.0	14 52.5
22	29.76	62	31 14 35.0	14 13.5	14 53.2	14 52.0
May 21	.5...Mean...		31 14 36.2	14 20.5	14 55.1	14 52.2
Refract. + Reduct.			−1 50.4	1 50.4	1 50.4	1 50.4
Superior Culminat.			31 13 11.7	13 11.8	13 12.4	13 18.8
Inferior Culminat...			328 46 22.4	46 6.5	46 39.9	46 24.2
Half Diff. S. P. D.			31 13 11.7	13 11.8	13 12.4	13 18.8

Inferior Culmination.

1822.	Barom.	Therm.	Microscopes. I.	II.	III.	IV.
	inches.		° ′ ″	′ ″	′ ″	′ ″
May 24	29.78	50	329 0 9.5	59 51.0	0 27.0	0 18.0
26	29.84	44	329 0 19.0	59 58.2	„ 36.2	„ 17.7
28	30.04	44	329 0 15.0	0 1.3	„ 35.0	„ 26.7
30	29.63	51	328 59 58.7	59 47.8	„ 13.4	„ 7.0
May 27	... Mean ...		329 0 10.5	59 54.6	0 28.0	0 12.3
Refract. and Reduct.			−13 48.1	13 48.1	13 48.1	13 48.1
			328 46 22.4	46 6.5	46 39.9	46 24.2

Mean of 4 Microscopes.....31° 13′ 15″.7 by 6 Observ.

1828.	Barom.	Therm.	Microscopes. I.	II.	III.	IV.
	inches.		° ′ ″	′ ″	′ ″	′ ″
June 4	29.94	49	31 26 4.7	26 10.8	26 21	26 5.4
12	29.97	52	„ „ 17.1	„ 12.2	„ 24	„ 16.4
13	30.02	49	„ „ 11.4	„ 13.5	„ 24.4	„ 18.2
17	30.03	54	„ „ 9.8	„ 11.5	„ 17.0	„ 12.1
June 11	.5...Mean...		31 26 11.0	26 12.0	26 21.6	26 13.0
Refract. and Reduct.			+4.5	4.5	4.5	4.5
Superior Culminat.			31 26 15.5	26 16.5	26 26.1	26 17.5
Inferior Culminat...			329 0 7.5	0 16.7	0 15.9	0 5.3
Half Diff. S. P. D.			31 13 4.0	12 59.9	13 5.1	13 6.2

Inferior Culmination.

1828.	Barom.	Therm.	Microscopes. I.	II.	III.	IV.
	inches.		° ′ ″	′ ″	′ ″	′ ″
June 12	30.05	29	329 16 30.0	16 40.5	16 42	16 31.3
17	30.11	39	„ „ 2.0	„ 11.0	„ 8.0	15 59.0
19	30.34	34	„ „ 18.0	„ 27.0	„ 26	16 14.0
June 16	... Mean ...		329 16 17.0	16 26.2	16 25.4	16 14.8
Refract. and Reduct.			−16 9.5	16 9.5	16 9.5	16 9.5
			329 0 7.5	0 16.7	0 15.9	0 5.3

Mean Inside Temperature 45°.

Mean of 4 Microscopes.....31° 13′ 3″.8 by 7 Observ.

Mean S. P. D. of η Argus, Jan. 1, 1828 . . . . . 31° 13′ 18″.7 by 13 Observ.

β Crucis. (Ann. Var. — 19″.755.)

Superior Culmination.

1822.	Barom.	Therm.	Microscopes. I.	II.	III.	IV.
	inches.	°	° ′ ″	′ ″	′ ″	′ ″
Oct. 30	29.79	77	69 13 1.6	.....	13 16.8	13 9.8
31	29.53	88	„ „ 9.7	.....	„ 19.5	„ 11.0
Nov. 1	29.66	76.5	„ „ 2.3	.....	„ 22.0	„ 11.2
2	29.75	80	„ „ 3.7	.....	„ 15.0	„ 9.5
3	30.50	68	„ „ 5.0	.....	„ 22.0	„ 9.0
6	29.62	75	„ „ 2.2	13 44.5	„ 20.5	„ 7.8
7	29.78	65.5	„ „ 7.5	„ 42.0	„ 21.2	„ 5.5
9	30.10	68.3	„ „ 5.9	„ 46.8	„ 21.8	„ 11.0
12	30.10	78	„ „ 10.0	„ 55.0	„ 21.0	„ 5.0
14	29.98	90	„ „ 7.1	„ 46.5	„ 23.6	„ 9.9
27	30.16	78	„ „ 2.0	„ 47.0	„ 24.8	„ 10.7
28	30.08	78	„ „ 1.0	„ 44.0	„ 19.3	„ 7.7
Dec. 12	29.56	75.5	„ „ 6.0	„ 30.7	„ 28.8	„ 18.7
13	29.52	78.2	„ „ 2.7	„ 30.0	„ 26.3	„ 13.8
14	29.60	74.5	„ „ 3.0	„ 31.6	„ 25.8	„ 15.3
16	29.62	64	„ „ 0.5	„ 42.0	„ 24.8	„ 49.5
Nov. 22	... Mean ...		69 13 4.0	13 41.8	13 22.1	13 10.3
	Refract. and Reduct.		−2 14.5	2 14.5	2 14.5	2 14.5
	Superior Culminat.		69 10 49.5	11 27.3	11 7.6	10 55.8
	Inferior Culminat...		6 40 28.2	41 6.6	40 40.9	40 25.3
	Half Diff. S. P. D.		31 15 10.6	15 10.4	15 13.3	15 15.3

Inferior Culmination.

1822.	Barom.	Therm.	Microscopes. I.	II.	III.	IV.
	inches.	°	° ′ ″	′ ″	′ ″	′ ″
Nov. 3	29.72	68.3	6 53 0.0	.....	53 13	52 55.7
10	30.07	53.5	„ 53 49.7	54 21.0	54 4.4	53 45.0
13	30.00	64	„ 53 23.5	53 50	53 36.4	53 16.1
19	30.06	63.8	„ 53 11.5	53 55.5	53 25.1	53 3.7
27	30.19	64.5	„ 53 27.8	54 2.3	53 41.3	53 21.0
28	30.09	67.8	„ 53 0.5	53 37.2	53 16.7	53 8.0
29	30.03	67.0	„ 53 57.7	53 39.0	53 12.4	53 1.0
Nov. 18	... Mean ...		6 53 15.8	53 54.2	53 28.5	53 12.9
	Refract. and Reduct.		−12 47.6	12 47.6	12 47.6	12 47.6
			6 40 28.2	41 6.6	40 40.9	40 25.3

Mean Inside Temperature 69°.

Mean of 4 Microscopes.....31° 15′ 12″.4 by 23 Observ.

β Crucis. (Ann. Var. — 19.″755.)—(Continued.)

Superior Culmination.

1828.	Barom.	Therm.	Microscopes. I.	II.	III.	IV.
	inches.	°	° ′ ″	° ′ ″	° ′ ″	° ′ ″
Oct. 6	30.16	54	31 29 53	29 49.5	30 0.0	29 54.5
7	30.15	75	„ 29 53	29 56.0	29 59.0	„ 56.5
8	29.68	60.5	„ 29 51.2	29 57.3	29 58.4	„ 55.0
16	29.93	68.5	„ 29 50.0	29 58.3	29 57.0	„ 53
20	29.75	82.2	„ 29 51.2	29 52.0	29 51.7	„ 55
21	29.89	62.8	„ 29 45.0	29 47.0	29 49.3	„ 47.0
25	29.82	68	„ 29 53.3	29 58.4	29 58.3	„ 57.0
27	29.85	73.5	„ 29 55.0	29 58.0	30 1.0	„ 55
Nov. 1	29.58	73	„ 29 57.3	29 57.6	30 1.7	„ 55.5
2	29.70	66	„ 30 1.3	30 5.0	30 1.0	„ 56.3
3	29.94	68.7	„ 29 56.0	29 59.5	30 0.2	„ 53.0
7	29.84	77	„ 29 50.0	29 54.0	29 52.0	„ 51.0
11	29.55	73.5	„ 29 55.0	29 57.1	30 0.7	„ 55.3
12	29.57	75	„ 30 0.0	29 56.5	29 59	„ 59.5
17	29.63	67.5	„ 29 54.5	29 55.5	30 1.0	„ 58.0
27	30.00	79	„ 29 51.4	30 3.8	29 53.8	„ 53.5
Dec. 13	30.10	75	„ 29 57.7	30 1.6	30 5.5	„ 59.3
14	29.95	72	„ 29 53.6	30 54.3	30 51.0	„ 51.5
15	29.83	84	„ 29 52.0	30 56.7	30 55.5	„ 54.0
Nov. 5	... Mean ...		31 29 53.6	29 57.3	29 57.5	29 54.7
Refract. — Reduct.			−14.8	14.8	14.8	14.8
Superior Culminat.			31 29 38.8	29 42.5	29 42.7	29 39.9
Inferior Culminat...			328 59 2.6	59 15.8	59 2.3	59 5.0
Half Diff. S. P. D.			31 15 18.1	15 13.3	15 20.2	15 17.5

Inferior Culmination.

1828.	Barom.	Therm.	Microscopes. I.	II.	III.	IV.
	inches.	°	° ′ ″	° ′ ″	° ′ ″	° ′ ″
Oct. 6	30.04	48.5	329 14 19.2	14 27.5	14 25.0	14 24.9
24	30.16	53	„ 14 9.0	14 22.0	14 12.0	14 13.0
27	29.78	61	„ 13 44.0	13 58.0	13 49.0	13 49.9
Nov. 3	29.85	52	„ 13 52.0	14 6.0	13 58.2	13 56.0
4	29.99	59	„ 13 49.5	14 1.3	13 54.7	13 47.0
13	29.69	59	„ 13 45.4	14 0.2	13 55.0	13 48.5
15	29.55	63	„ 13 26.0	13 45.0	13 33.0	13 28.0
17	29.50	66	„ 13 21.0	13 33.0	13 27.0	13 24.4
20	29.50	70	„ 13 51.5	13 59.0	13 54.4	13 53.0
26	29.85	80	„ 13 49.0	13 1.0	13 53.0	13 51.0
27	29.90	67	„ 13 23.7	13 33.0	13 26.0	13 25.6
Nov. 8	... Mean ...		329 13 41.0	13 54.2	13 40.7	13 43.4
Refract. — Reduct.			−14 38.4	14 38.4	14 38.4	14 38.4
			328 59 2.6	59 15.8	59 2.3	59 5.0

Mean Inside Temperature 66°.7.

Mean of 4 Microscopes.....31° 15′ 17″.27 by 30 Observ.

Mean S. P. D. of β Crucis, Jan. 1, 1828 . . . . . 31° 15′ 15″.3 by 53 Observ.

α Eridani. (Ann. Var. + 18″.462.)

Superior Culmination.

1822.	Barom.	Therm.	Microscopes. I.	II.	III.	IV.
	inches.	°	° ′ ″	° ′ ″	° ′ ″	° ′ ″
May 2	30.09	64	31 51 52.7	52 47.2	51 55	51 39.7
5	30.28	66.5	„ „ 49.3	„ 48.5	„ 51.7	„ 40.0
9	29.91	59.3	„ „ 47.0	„ 10.5	„ 54.2	„ 38.3
10	30.11	53	„ „ 45.5	„ 11.8	„ 51.0	„ 40.0
May 6,5	...Mean...		31 51 48.6	52 29.5	51 53.0	51 39.5
Refract. and Reduct.			+1 7.2	1 7.9	1 7.9	1 7.3
Superior Culminat.			31 52 55.8	53 36.7	53 0.2	52 46.8
Inferior Culminat...			328 6 52.3	7 10.0	7 2.7	6 34.6
Half Diff. S. P. D.			31 53 1.7	53 13.3	52 58.7	53 6.1

Inferior Culmination.

1822.	Barom.	Therm.	Microscopes. I.	II.	III.	IV.
	inches.	°	° ′ ″	° ′ ″	° ′ ″	° ′ ″
May 9	29.86	60.5	328 24 49.5	25 1.3	24 55.3	24 39.5
11	30.17	47.7	328 25 23.0	25 46.5	25 38.0	24 57.5
May 10	... Mean ...		328 25 6.2	25 23.9	25 16.6	24 48.5
Refract. and Reduct.			−18 13.9	18 13.9	18 13.9	18 13.9
			328 6 52.3	7 10.0	7 2.7	6 34.6

Mean Inside Temperature 48°.

Mean of 4 Microscopes.....31° 53′ 4″.97 by 6 Observ.

α Eridani. (Ann. Var. + 18″.462.)—(Continued.)

Superior Culmination.

1822.	Barom.	Therm.	Microscopes. I.	II.	III.	IV.
	inches.	°	′ ″ ″	′ ″	′ ″	′ ″
May 21	29.91	58	31 51 52.5	51 56	52 7.1	52 1.4
25	29.68	55	„ „ 56.6	„ 26.2	„ 11.0	„ 0.0
28	30.03	52	„ „ 52.7	„ 8.0	„ 15.7	„ 6.0
June 2	29.87	57	„ „ 52.7	„ 13.0	„ 32.0	„ 3.0
May 27	... Mean ...		31 51 53.7	51 18.3	52 17.7	52 2.6
Refract. and Reduct.			+39.7	59.7	59.7	59.7
Superior Culminat.			31 52 53.4	52 18.0	53 17.4	53 2.3
Inferior Culminat...			328 6 30.2	6 1.0	6 44.0	6 27.6
Half Diff. S. P. D.			31 53 11.6	53 8.5	53 16.7	53 17.4

Inferior Culmination.

1822.	Barom.	Therm.	Microscopes. I.	II.	III.	IV.
	inches.	°	′ ″ ″	′ ″	′ ″	′ ″
May 27	29.98	50	328 25 20.2	24 51	25 38.6	25 20.5
29	29.93	47	„ „ 20.6	„ 57.0	„ 39.5	„ 15.4
30	29.71	48	„ „ 27.2	„ 47.5	„ 35.0	„ 19.8
June 2	29.92	50	„ „ 15.0	.....	„ 27.7	„ 16.2
May 28	... Mean ...		328 25 20.8	24 51.4	25 34.4	25 18
Refract. and Reduct.			−18 50.4	18 50.4	18 50.4	18 50.4
			328 6 30.2	6 1.0	6 44.0	6 27.6

Mean Inside Temperature 48°.

Mean of 4 Microscopes.....31° 53′ 13″.5 by 8 Observ.

Superior Culmination.

1822.	Barom.	Therm.	Microscopes. I.	II.	III.	IV.
	inches.	°	′ ″ ″	′ ″	′ ″	′ ″
June 1	29.86	49	31 51 56	51 52.7	52 9.8	52 17.0
3	29.86	52	„ 51 57.0	52 0.0	„ 16.8	52 4.0
7	30.15	39	„ 51 58	51 58	„ 25.0	52 7.0
9	29.88	40	„ 52 0.5	51 58.5	„ 23.3	52 13.0
10	29.67	50	„ 52 1.5	51 53.0	„ 26.0	52 10.0
12	29.80	52	„ 52 0.5	51 51.0	„ 26.0	51 59.0
15	30.05	40	„ 52 3.7	51 54.8	„ 23.8	52 11.7
16	30.00	39.5	„ 52 4.0	51 51.5	„ 24.3	52 12.0
17	29.93	46	„ 52 5.8	51 53.7	„ 26.3	52 9.3
20	30.00	31	„ 52 9.0	51 54.5	„ 31.4	52 12.0
21	29.74	41	„ 52 14.0	51 2.7	„ 32.0	52 20.7
22	29.68	48	„ 52 12.8	51 9.0	„ 38.4	52 16.8
23	29.89	48	„ 52 11.0	51 59.2	„ 34.0	52 19.0
June 13	... Mean ...		31 52 4.1	51 56.8	52 25.9	52 11.7
Refract. and Reduct.			+54.1	54.1	54.1	54.9
Superior Culminat.			31 52 58.3	52 50.9	53 20.0	53 5.9
Inferior Culminat...			328 6 20.0	6 12.0	6 31.9	6 15.0
Half Diff. S. P. D.			31 53 19.1	53 19.4	53 24.0	53 25.4

Inferior Culmination.

1822.	Barom.	Therm.	Microscopes. I.	II.	III.	IV.
	inches.	°	′ ″ ″	′ ″	′ ″	′ ″
June 1	29.70	53	328 24 58	24 22.0	24 50	24 32.5
4	29.99	46	„ 25 28	25 34.0	25 33.7	25 17.6
9	29.92	47.5	„ 25 11.5	25 0.8	25 25.2	25 12.2
14	29.95	47.5	„ 25 9.0	24 53.4	25 21.5	25 8.5
20	30.00	36.5	„ 25 43.6	25 48.0	25 58.4	25 36.3
21	30.00	42.5	„ 25 34.7	25 18.5	25 47.6	25 27.7
June 11	... Mean ...		328 25 17.5	25 9.5	25 29.4	25 12.5
Refract. and Reduct.			−18 57.5	18 57.5	18 57.5	18 57.5
			328 6 20.0	6 12.0	6 31.9	6 15.0

Mean Inside Temperature 47°.

Mean of 4 Microscopes.....31° 53′ 22″.0 by 19 Observ.

α Eridani. (Ann. Var. + 18″.462.)—(Continued.)

Superior Culmination.

1822.	Barom.	Therm.	Microscopes. I.	II.	III.	IV.
	inches.	°	° ′ ″	° ′ ″	° ′ ″	° ′ ″
July 12	30.10	40	69 48 27	48 5.0	48 32	48 29
25	30.24	32.4	„ „ 19	„ 29.0	„ 28.3	„ 27
26	30.17	37	„ „ 25	„ 26	„ 29.0	„ 32
July 21	... Mean ...		69 48 23.7	48 20	48 29.8	48 29.3
Refract. and Reduct.			+ 47.2	47.3	47.2	47.3
Superior Culminat.			69 49 10.9	49 7.3	49 17.0	49 16.6
Inferior Culminat...			6 2 25.3	2 26.8	2 28.8	2 32.2
Half Diff. S. P. D.			31 53 22.8	53 20.2	53 24.1	53 22.2

Inferior Culmination.

1822.	Barom.	Therm.	Microscopes. I.	II.	III.	IV.
	inches.	°	° ′ ″	° ′ ″	° ′ ″	° ′ ″
July 25	30.09	51	6 21 5.5	21 7	21 9.0	21 13.7
26	30.22	52.3	„ „ 6.5	21 8.0	21 10.0	21 12.0
July 25	.5... Mean...		6 21 6.0	21 7.5	21 9.5	21 12.8
Refract. and Reduct.			− 18 40.7	18 40.7	18 40.7	18 40.6
			6 2 25.3	2 26.8	2 28.8	2 32.2

Mean of 4 Microscopes ..... 31° 53′ 22″.3 by 5 Observ.

1828.	Barom.	Therm.	Microscopes. I.	II.	III.	IV.
	inches.	°	° ′ ″	° ′ ″	° ′ ″	° ′ ″
Feb. 21	30.05	34	39 7 17.5	7 26	7 39.4	7 54
25	29.89	36	„ „ 13.5	„ 21.3	„ 28.0	„ 22.8
27	29.83	36	„ „ 13.0	„ 19.8	„ 27.3	„ 23.4
Mar. 3	29.85	73	„ „ 15.0	„ 21.0	„ 32.7	„ 22.0
10	29.51	93.3	„ „ 6.3	„ 10.5	„ 25.3	„ 6.6
11	29.76	80	„ „ 3.0	„ 7	„ 19.5	„ 8.0
13	29.90	89.7	„ „ 2.7	„ 13.1	„ 21.1	„ 10.0
19	29.74	95.5	„ „ 0.0	„ 1.2	„ 14.3	„ 3.0
30	29.94	73	„ „ 3.4	„ 14.0	„ 23.5	„ 11.4
Apr. 1	29.67	76	„ „ 7.0	„ 12.0	„ 26.0	„ 12.1
Mar. 10	... Mean ...		39 7 8.1	7 14.6	7 25.7	7 14.3
Refract. and Reduct.			− 13.7	13.7	13.7	13.7
Superior Culminat.			39 6 54.4	7 0.9	7 12.0	7 0.6
Inferior Culminat...			338 20 28.0	20 33.9	20 38.2	20 29.6
Half Diff. S. P. D.			31 53 13.2	53 13.5	53 16.9	53 15.5

Inferior Culmination.

1828.	Barom.	Therm.	Microscopes. I.	II.	III.	IV.
	inches.	°	° ′ ″	° ′ ″	° ′ ″	° ′ ″
Feb. 21	30.02	38.5	338 37 54	37 59	38 4.5	37 55.7
25	30.02	61	„ 37 44	„ 45	37 49.0	37 47.0
Mar. 6	29.83	57	„ 37 15.8	„ 24.5	37 31.0	37 14.0
31	29.85	66.5	„ 36 51.2	„ 0.0	37 1.2	36 54.7
Mar. 5	... Mean ...		338 37 26.2	37 32.1	37 36.4	37 27.8
Refract. and Reduct.			− 16 58.2	16 58.2	16 58.2	16 58.2
			338 20 28.0	20 33.9	20 38.2	20 29.6

Mean Inside Temperature 73°.

Mean of 4 Microscopes ..... 31° 53′ 14″.8 by 14 Observ.

α Eridani. (Ann. Var. + 18″.462.)—(Continued.)

Superior Culmination.

1828.	Barom.	Therm.	Microscopes. I.	II.	III.	IV.
	inches.	°	° ′ ″	′ ″	′ ″	′ ″
May 12	29.81	78.4	32 7 6	7 13.3	7 23	7 13
13	29.88	72.3	„ „ 9	„ 14.2	„ 25	„ 11.9
14	29.99	60.6	„ „ 2.5	„ 10.9	„ 19.3	„ 8.8
15	30.06	56	„ „ 3.7	„ 12.0	„ 17.8	„ 3.0
17	30.15	51.5	„ „ 4.0	„ 13.0	„ 20.3	„ 3.0
18	30.29	50.3	„ „ 5.0	„ 10.8	„ 16.1	„ 6.1
19	30.49	51	„ „ 5.0	„ 11.2	„ 22.3	„ 4.7
20	30.41	56	„ „ 4.8	„ 12.2	„ 20.1	„ 8.1
23	30.31	56.2	„ „ 4.7	„ 13.0	„ 23.7	„ 5.2
26	29.97	61.2	„ „ 5.5	„ 15.5	„ 24.2	„ 10.8
27	29.99	50	„ „ 11.8	„ 16.2	„ 20.0	„ 11.3
28	29.89	47	„ „ 8.5	„ 16.0	„ 22	„ 7.5
29	29.83	46	„ „ 11.0	„ 13.0	„ 22.7	„ 7.7
30	29.81	49	„ „ 5.0	„ 12.2	„ 23.2	„ 8.8
31	30.01	44	„ „ 6.9	„ 13.0	„ 26.0	„ 10.7
June 1	30.05	44.7	„ „ 3.2	„ 14.0	„ 18.7	„ 6.0
6	29.57	46	„ „ 4.5	„ 17.8	„ 24.3	„ 12.2
7	29.44	44.3	„ „ 10.7	„ 20.3	„ 27.0	„ 14.0
8	29.46	51.5	„ „ 10.0	„ 17.0	„ 24.4	„ 9.0
10	29.75	39.5	„ „ 11.0	„ 22.0	„ 28.5	„ 13.7
11	29.76	35	„ „ 15.5	„ 19	„ 24.2	„ 18.5
May 26... Mean ...			32 7 7.1	7 14.6	7 22.5	7 9.2
Refract. and Reduct.			−42.3	42.3	42.3	42.4
Superior Culminat.			32 6 24.8	6 32.3	6 40.2	6 26.8
Inferior Culminat...			328 19 49.8	19 56.5	19 53.9	19 37.4
Half Diff. S. P. D.			31 53 17.5	53 17.9	53 23.1	53 24.7

Inferior Culmination.

1828.	Barom.	Therm.	Microscopes. I.	II.	III.	IV.
	inches.	°	° ′ ″	′ ″	′ ″	′ ″
May 12	29.67	75.5	328 35 40.4	35 50	35 50	35 43
14	29.93	59	„ 36 25.0	36 32.5	36 33.3	36 25
16	30.07	41.8	„ 37 36.4	37 44	37 43.0	37 31.7
19	30.34	39.3	„ 37 54.5	37 58.5	38 2.1	37 51.2
20	30.39	45.3	„ 37 31.0	37 33.5	37 39.8	37 22.3
27	29.99	51.7	„ 36 50.8	36 59.5	37 3.0	36 47.0
29	29.84	45.3	„ 36 54.3	37 4.0	37 6.0	36 51.3
June 6	29.70	48.5	„ 36 44.0	36 53.3	36 53.0	36 45.0
19	30.02	36.8	„ 37 36	37 38	37 39	37 36.5
May 24... Mean ...			328 37 1.4	37 8.1	37 5.5	36 59
Refract. and Reduct.			−17 11.6	17 11.6	17 11.6	17 11.6
			328 19 49.8	19 56.5	19 53.9	19 37.4

Mean Inside Temperature 59°.

Mean of 4 Microscopes ..... 31° 53′ 20″.8 by 30 Observ.

Mean S. P. D. of α Eridani, Jan. 1, 1828 . . . . . 31° 53′ 18″.39 by 82 Observ.

α Eridani appearing in its lower culmination like a double star, the upper being always red and the lower white, I observed the chord common to their segments

Mean South Polar Distances of the preceding Stars, for the beginning of 1828, with their Constants of Aberration and Nutation.

Stars' Names.	Mean S. P. D. Jan. 1, 1828.	Annual Variation.	No. of Obs.	Constants	
				Of Aberration.	Of Nutation.
	° ′ ″	″		° ′ ″ ″	° ′ ″ ″
ε Octantis	3 40 10.11	+19.967	19	5 26 56 1.30805	11 25 25 0.85683
σ Octantis	0 45 13.28	− 5.729	15	9 27 47 1.37457	3 19 41 0.96551
ν Octantis	1 24 41.71	+19.293	58	6 14 5 1.30943	0 20 59 0.86804
34 Octantis	2 22 55.65	+ 3.589	4	9 12 16 1.26247	3 8 16 0.98066
ζ Octantis	5 2 15.9	−15.234	3	1 9 36 1.39973	7 18 40 0.91996
α Octantis	5 6 13.12	−18.970	22	11 14 15 1.39707	8 5 48 0.87317
π Octantis	6 19 51.2	−19.330	29	0 16 11 1.30065	6 19 41 0.86756
3 γ Octantis	6 49 7.20	+20.096	25	5 26 57 1.30469	0 6 16 0.85697
2 γ Octantis	6 52 22.32	+19.997	24	5 29 49 1.30909	0 4 11 0.85676
1 γ Octantis	7 1 29.77	+19.960	25	6 1 24 1.30167	11 29 29 0.85734
ϑ Octantis	7 7 54.77	−17.228	76	11 4 48 1.28417	4 22 16 0.89607
ω Octantis	7 40 3.7	−15.67	5	10 26 36 1.27599	4 13 10 0.91506
β Octantis	7 43 18.12	+18.436	80	6 18 26 1.28012	0 29 52 0.88168
ι Octantis	8 42 40.7	+17.336	33	6 24 32 1.28010	1 7 45 0.89585
γ Apodis	11 30 35.74	− 9.433	80	10 3 9 1.23804	3 21 51 0.96150
β Chamæleontis	11 38 38.1	−19.997	2	0 3 8 1.3978	5 27 25 0.8540
ν Chamæleontis	11 39 53.8	−13.338	2	1 19 5 1.30460	7 26 23 0.93859
α Apodis	11 41 48.66	−16.154	32	10 29 49 1.26470	4 14 57 0.91341
1 δ Apodis	11 45 23.33	−10.405	6	10 6 37 1.23786	3 24 23 0.95456
β Hydri	11 46 35.75	+19.972	184	5 21 20 1.30106	11 24 25 0.85715
2 δ Apodis	11 47 3.46	−10.405	5	10 6 37 1.23786	3 24 23 0.95456
ε Octantis	11 59 1.25	+19.999	3	7 13 59 1.43179	0 2 34 0.85645
β Apodis	12 51 44.44	− 8.600	54	10 0 2 1.22651	3 19 25 0.96590
α Chamæleontis	13 37 25.52	−11.69	18	1 24 57 1.30430	8 1 25 0.94810
γ Hydri	15 14 9.7	+10.7	74	3 1 28 1.30485	9 25 17 0.95480
ι Pavonis	16 39 6.3	+ 8.446	12	7 29 13 1.30610	2 10 47 0.96632
2 α Apodis	17 8 31.64	−12.889	8	10 17 51 1.22325	4 1 50 0.94958
1 α Apodis	17 13 8.1	−13.346	8	10 20 1 1.22632	4 3 41 0.93645
ϑ Muscæ	19 22 52	−19.528	6	11 26 49 1.27199	5 13 19 0.86427
γ Piscis Volantis	19 46 53.41	− 6.034	33	2 13 30 1.30608	8 16 45 0.97547
β Hydri	20 33 23.16	+16.458	28	4 20 49 1.30381	10 17 6 0.90650
ω Argus	20 48 52.45	−17.735	4	1 3 11 1.30145	7 5 3 0.89076
β Argus	20 59 24.93	−14.844	356	1 16 3 1.30514	7 20 35 0.92344
α Trianguli	21 18 9.15	− 7.62	116	9 28 45 1.17383	3 16 3 0.96994
α Muscæ	21 48 48.54	−19.871	85	0 2 59 1.27129	5 20 58 0.85866
ι Piscis Volantis	21 53 19.05	−10.554	4	2 0 42 1.30637	8 5 12 0.9557
γ Trianguli	21 57 56.63	−13.984	47	10 25 21 1.9071	4 6 34 0.9300
ϑ Pavonis	23 23 38.44	+ 9.406	12	7 22 36 1.16991	2 7 43 0.96066
ι Trianguli	24 16 20.45	−12.817	14	10 20 42 1.18424	4 1 50 0.94058
α Piscis Volantis	24 17 18.25	−14.12	2	1 19 43 1.3031	7 23 32 0.9301

Stars' Names.	Mean S. P. D. Jan. 1, 1828.	Annual Variation.	No. of Obs.	Constants	
				Of Aberration.	Of Nutation.
	° ′ ″	″		° ′ ″	° ′ ″
π Pavonis	25 22 17.12	+ 1.756	4	9 9 10 1.5903	3 3 55 0.98261
ν Argus	25 43 47.9	−16.591	7	1 18 56 1.2982	7 19 41 0.9061
ℓ Argus	26 30 20.05	−18.709	6	0 29 17 1.28849	6 27 2 0.87725
π Circini	26 39 11.4	−14.753	6	11 0 21 1.18634	4 9 5 0.92418
β Trianguli	27 6 42.2	−11.456	43	10 17 35 1.15380	3 28 2 0.9489
α Hydri	27 35 25.9	+17.628	22	4 23 51 1.29170	10 24 5 0.82343
1 α Crucis	27 51 17.1	−19.987	33	0 8 5 1.25617	5 24 11 0.85722
α Tuscanæ	28 53 18.46	+17.596	76	6 13 16 1.30749	1 5 21 0.89135
1 α Centauri	29 52 37.66	−15.985	4		
2 α Centauri	29 52 37.905	−15.984	94	11 7 48 1.17946	4 14 29 0.91217
β Centauri	30 27 37.7	−17.690	29	11 17 31 1.19829	4 24 32 0.89160
π Argus	31 13 18.7	−18.779	13	1 0 55 1.27704	6 26 28 0.87640
β Crucis	31 15 15.3	−19.760	57	0 5 14 1.33385	5 17 24 0.86094
α Eridani	31 53 18.89	+18.453	82	4 26 47 1.277694	11 0 30 0.88109

Length of the Pendulum at Paramatta.

The length of the pendulum vibrating seconds of mean solar time at Paramatta in vacuo on the level of the sea at 0° Reaumur, is 992.4128 millimetres. My observations for the determination thereof have been published in the second part of the third volume of the Memoirs of the Astronomical Society of London. I took the measure from a brass meter made by Lenoir at Paris, which after my return to London was compared, by Messrs. Troughton and Simms, with Sir George Shuckburgh's Scale of the same metal, and found = 39.387988 English inches. Hence follows the length of the pendulum vibrating seconds at Paramatta as above 39.0891435 English inches.

Additions and Corrections.

Page 17.—The immersion of 82 Geminorum, March 21, 1823, at $9^h\ 52^m\ 11^s.6$, is mean time, and not sidereal time.

Page 29.—The longitude of Government House at Sydney, deduced from the Solar eclipses observed by

Admiral Bligh, is . . . . . $10^h\ 5^m\ 10^s.5$
Captain King . . . . . 10 5 8.2 } East of Greenwich.

Page 26.—Additional Observations of Moon-culminating Stars.

1828.	Stars.	Interval.	1828.	Stars.	Interval.
		m s			m s
August 22	ε 1 Sagittarii	+ 8 16.96	Novemb. 16	20 Piscium	+28 15.98
☾ II.	ε 2 Sagittarii	+10 4.63	☾ I.	24 Piscium	+33 15.55
				29 Piscium	+39 2.10

Page 46.—Obliquity of the Ecliptic deduced from the solstices observed at Paramatta:

With the Repeating Circle.				With the Mural Circle.			
Year of Observation.	Observed Mean Obliquity.	Reduction to Jan. 1, 1828.	Mean Obliquity, Jan. 1, 1828.	Year of Observation.	Observed Mean Obliquity.	Reduction to Jan. 1, 1828.	Mean Obliquity, Jan. 1, 1828.
Jan. 1822	23 27 41.96	−2.7	23 27 39.96				
1823	" " 44.12	−2.25	" " 41.87	Jan. 1823	23 27 44.36	−2.25	23 27 42.11
1824	" " 42.67	−1.80	" " 40.87				
1827	" " 44.52	−0.45	" " 44.07	1827	" " 43.63	−0.45	" " 43.18
1828	" " 39.35	0	" " 39.35	1828	" " 43.19	0.0	" " 43.19
1829	" " 38.75	+0.45	" " 39.20				
	Mean.....		23 27 40.77		Mean.....		23 27 42.49

The error is on the side of the Repeating Circle.

Omitted in page 111.] γ Piscis Volantis.

Superior Culmination.							Inferior Culmination.						
1828.	Barom.	Therm.	Microscopes. I.	II.	III.	IV.	1828.	Barom.	Therm.	Microscopes. I.	II.	III.	IV.
	inches.							inches.					
April 4	30.01	53.3	20 0 43	0 37	0 52	0 40.7	Apr. 7	30.05	53	340 30 56	31 0.2	31 1.4	31 2.0
5	30.03	69	" " 41.7	" 41.7	" 41.7	" 50.3	8	29.83	55	" " 55	30 55.5	31 0.2	30 58.5
6	30.20	63.5	" " 42	" 40.5	" 48.7	" 39.7	9	29.73	53	" " 49.7	30 49.7	30 55	30 55.0
7	30.14	66.5	" " 39	" 39	" 50.2	" 39.2	10	29.85	47.5	" " 58	31 6.6	30 57	31 0.0
10	29.75	71	" " 34.8	" 36.1	" 44.7	" 35.1	11	29.88	49.7	" " 48.4	30 58.0	30 56.5	30 54.5
11	29.84	64	" " 33.9	" 28.2	" 37.9	" 29.7							
12	29.95	63.5	" " 30.0	" 27.5	" 40.1	" 28.9	Apr. 9	... Mean ...		340 30 53.4	30 58	30 50.0	30 58
April 8	... Mean ...		20 0 37.7	0 35.7	0 46.27	0 36.33	Refract. and Reduct.			−4 13.8	4 13.8	4 13.8	4 13.8
Refract. and Reduct.			−10.5	10.5	10.5	10.5				340 26 39.6	26 44.2	26 36.2	26 44.2
Superior Culminat.			20 0 27.2	0 25.2	0 35.8	0 25.8							
Inferior Culminat.			340 26 39.6	26 44.2	26 36.2	26 44.2							
Half Diff. S. P. D.			19 46 53.8	46 50.5	46 59.8	46 50.8	Mean of 4 Microscopes.....19 46′ 53″.72 by 12 Observ.						

Page 128.—The barometer for the lower culmination of α Muscæ on June 23, was 29.84 inches in lieu of 29.48 inches, and the corresponding refraction 4′ 26″.52, which makes the south polar distance by a mean of the 4 microscopes for that Set of Observations 21° 48′ 49″.63.

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